

COAL AGE

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IT is surprising into how few words the really essential facts concerning coaldust in colliery explosions can be condensed. Volumes of matter on the subject have been written recently, and the investigators in each important coal-producing country have supplied their share of data. However, we fairly master the basic principles of present knowledge when we know that—

(1) The true flame of an explosion has a length of from 60 to 80 feet.

(2) The presence of a cloud of incombustible dust in the path of a coaldust explosion that has traveled 275 ft. checks continued propagation of the explosion.

(3) When stonedust is intimately mixed with coaldust, it becomes increasingly difficult to originate an explosion or to cause an explosion to be propagated.

(4) The existence of a "pioneering cloud" in front of an explosion has been established.

(5) Crusts of coke are usually found on the side of the props facing the direction of an explosion.

(6) The cost of treatment by scattering stonedust is about one-fifth of one cent per ton of coal mined.

(7) Only a laboratory test will determine the relative degree of danger to be apprehended from the dust of any particular coal.

To render dust innocuous, we must still follow one of four plans: (a) Dampen by water or steam, or provide wet zones; (b) use deliquescent salts; (c) intermix stone- or shale-dust; or (d) remove the dust.

The first three plans have received considerable attention, and experiments, especially with steam, have been quite successful in the face of active opposition by those who believed humidifying was injurious to men and weakening to roof. However, it is in the removal of the dust that radical changes are to be expected, and on this plan present thought is now centered.

Perhaps no one is ready to affirm that a dust-collector can be devised to remove all dust from coal mines. The crevices in the gob make such a result well nigh impossible. Several machines, however, are now in use and have been successful in collecting large quantities of dust and thus providing safe zones.

At first, the chief difficulty with vacuum cleaners in mines was that the area to be cleaned had to present a smooth surface to the suction tubes. This would have made it necessary to dress the entry or roadway with concrete, which practice, aside from its cost, was impossible in most mines due to the movement of the strata and destructive effect of pressure.

One of the first practical cleaners to be used in mines was fitted with five suction tubes and in operation could clean 50 running yards of a large roadway in 8 hours. Five men were required to operate the machine, and the cost was 12c. per running yard (English labor was used). The initial cost of such a dust-collector was \$720.

In those mines where this type of machine is used, after the dust has been removed from the surface, the gallery is painted with whitewash delivered by compressed air; the result is a clean entry and a well lighted shaft-bottom.

Recently, one improved collector has proved its ability to remove dust from uneven surfaces such as are presented in the average mine roadway. Air jets raise the dust from the roof and sides, and suction withdraws the dust-laden air. Either compressed air or electricity can be used as the source of energy.

The time is fast approaching when it will be considered as necessary to remove dust from a mine as it is now believed essential to remove gas and water. If the plan of going straight to the root of a matter has merit, then the removal of explosive coaldust from the underground workings will soon receive the careful attention of coal-mining people.

Electric Hoists at Collieries

By C. A. Tupper*

In the colliery districts of Germany, particularly around Dortmund, where the electric-motor drive for hoisting has made greater progress probably than in any other part of the world, notable success has been attained with the so called "Ilgner" system, supplied by the Siemens-Halske-Schuckert Werke and the Allgemeines Elektrizitäts Gesellschaft, of Berlin. This system includes a flywheel equalizing set, in the form of a motor-generator unit, between the power plant and the hoist motors, as shown in Fig. 1.

To avoid the starting losses inherent

Eight different systems for applying electric-motor drives to colliery hoists have been devised. Their characteristic features, advantages and disadvantages are discussed in this article.

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a large number of European collieries, as well as other mines, despite the objections of high initial cost and high operating expense.

THE CASCADE SYSTEM

At present, however, its popularity for this class of service is being challenged by two new systems to which attention was recently called in a paper read before the Institution of Mining Engineers, in London. The first of these is the so called "Cascade" system, Fig. 10, originated by the Sandycroft Foundry Company,

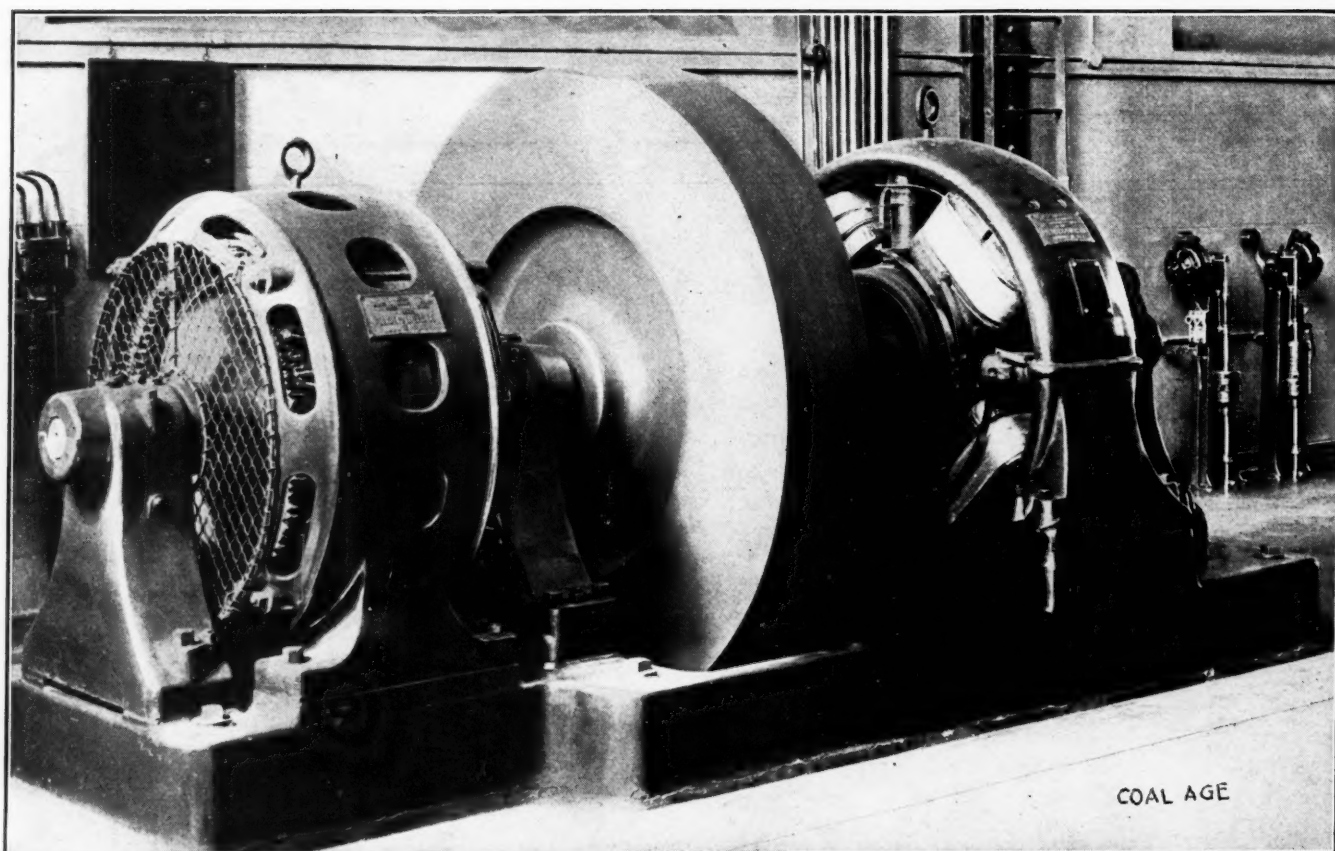


FIG. 1. FLYWHEEL MOTOR GENERATOR SET USED WITH ILGNER SYSTEM

with any type of resistance control, voltage regulation is used between the direct-current generator of the motor-generator set and the hoist motors. By means of suitable field control, the motor, during braking, is operated as a generator and the generator runs as a motor, thereby returning to the flywheel, and consequently to the power system, a certain amount of energy stored in all the moving masses. Reversing and speed control are effected entirely by respectively reversing and varying the field of the generator, thus obviating the necessity of using switches in the main motor circuit.

In order to obtain any benefit from the flywheel, it is necessary to permit a certain variation in the speed of the motor

generator to take place since the flywheel can store energy and give it up only by changing its speed. This is accomplished with a motor-generator set such as the one mentioned, by varying the resistance in the rotor circuit of the motor, so that whenever the current input to the motor exceeds a certain predetermined value, this resistance in the rotor circuit is increased and a gradual drop in the speed of the motor generator results; while on the other hand, if the current input falls below a certain value, this secondary resistance is decreased, the current input thereby increased and the flywheel caused to accelerate.

This system, as I learned during an extended trip abroad, has been installed at

Ltd., Sandycroft, Chester, England, in which alternating current from the power plant is supplied directly to alternating-current motors operating the colliery hoists.

Each of these machines may be described as two motors in one, there being two windings in the stator and two in the rotor. By manipulating the reactions of the two sets of windings on one another, it is possible to run the motor at two different speeds without the use of any resistances. At the same time the motor possesses, in common with the ordinary induction machine, the property of starting up with a large torque when resistances are inserted but with these additional advantages, that only about one-half the

energy is wasted in the process, while the torque is from 40 to 50 per cent. greater.

There is a further economy secured when braking, as then the motor will act as a generator for a part of the time and return energy to the line similarly to the

suitable for slow speeds, and have the advantage of being easily controlled at such speeds. Also at low speeds, they possess the property of developing, for a given consumption of energy, a greater torque than at high speeds, so

THE BROWN-BOVERI INSTALLATION

The second of the new systems, which has been developed by Brown, Boveri & Co., of Baden, Switzerland, and Mannheim, Germany, takes advantage, particularly, of the peculiar properties of large

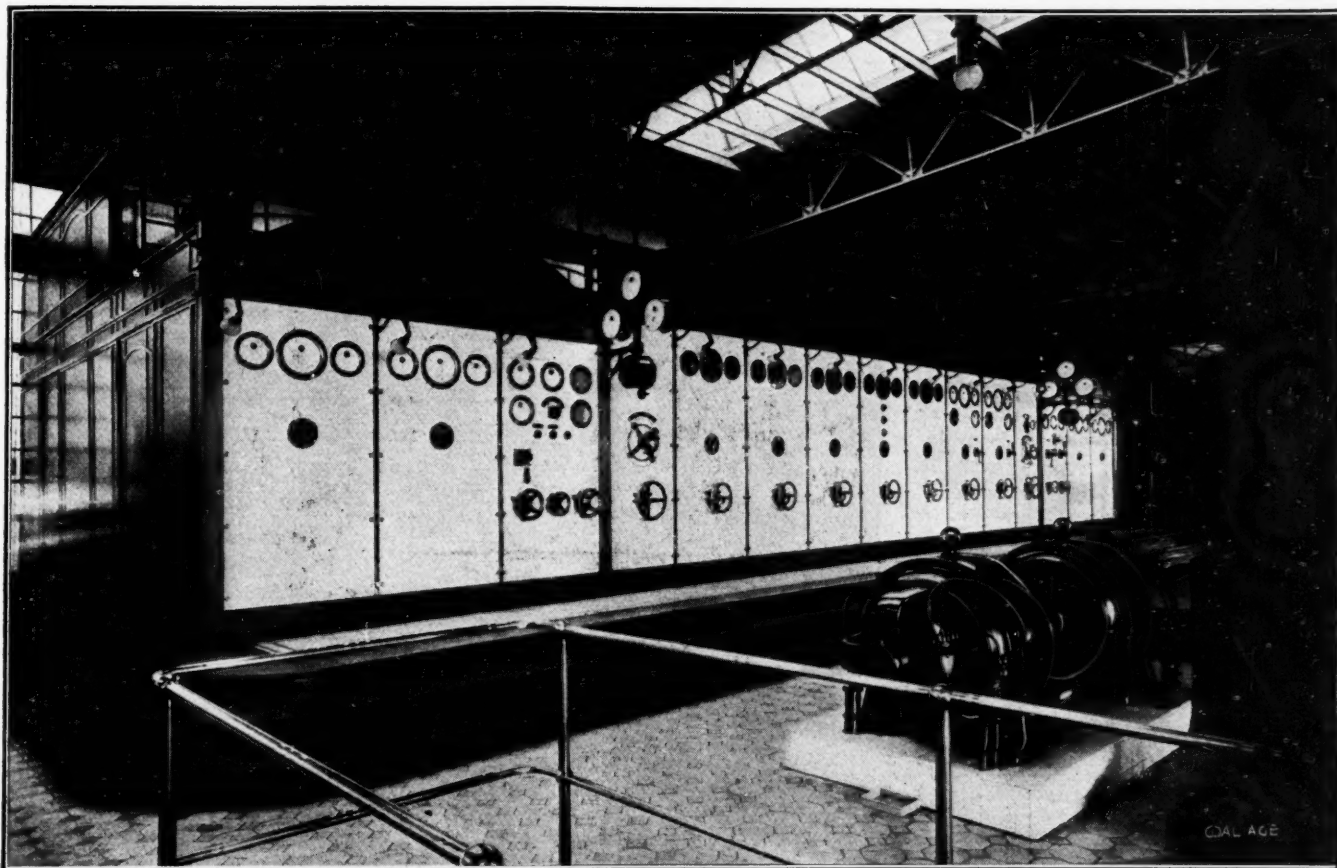


FIG. 2. BOOSTERS AND CONTROL SYSTEM, MINE NEAR HAMBORN, GERMANY

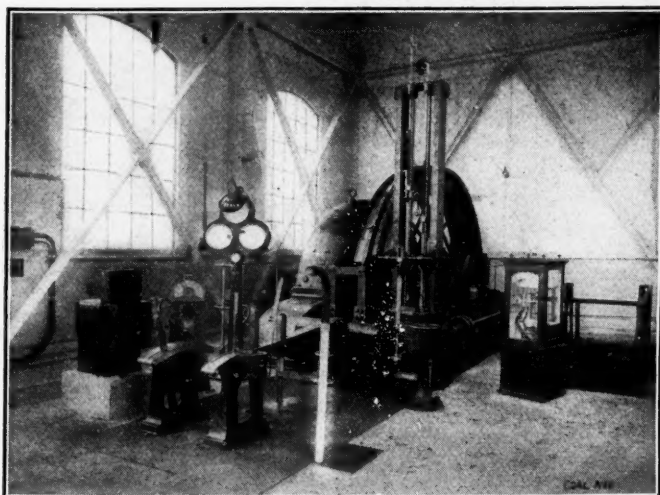


FIG. 3. THE CAGE HOIST
INSTALLATION OF A. E. G. ILGNER SYSTEM, "GERMANY" COLLIERY, KATTOWITZ, PRUSSIA

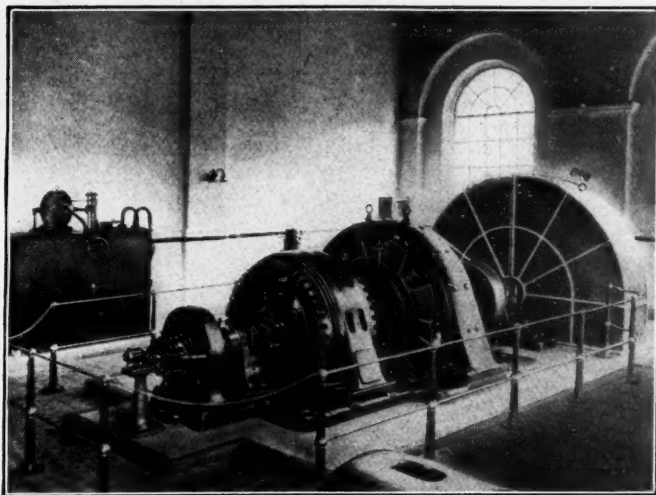


FIG. 4. THE FLYWHEEL MOTOR GENERATOR SET

"Ilgnier" system. The adoption of this type of motor undoubtedly improves the overall efficiency where the hoisting distances are short and the acceleration losses important. The power factor is high, and the slip small.

The motors are by nature especially

that the acceleration of the load is reduced automatically as speed is gained—a special advantage for hoisting purposes. The cost of the motors is but little more than that of the ordinary type, and they remove the necessity for expensive equalizing apparatus.

steam turbines in respect to close speed regulation and large overload capacity. The turbine shown in Fig. 5 has coupled to it a three-phase alternator, which supplies the ordinary power load of the colliery, and also a continuous-current generator, which is permanently connected to

the hoisting motor. The control of the hoisting is effected by varying or reversing the field of the generator, as required, on what is known as the Ward-Leonard principle.

This system, therefore, embraces all the advantages of the "Ilgner" System. The rating of the turbine should be suitable for the average load of the two generators, the boilers constituting the medium for the storage of energy. The turbine, with a fairly constant steadying load, runs at a high efficiency, and provides the peak loads required for the hoisting with little drop in either speed or efficiency. The first cost of the plant is low relatively to the "Ilgner" system, and there is less machinery to handle than with any other system. Where the hoisting load is not excessive, in proportion to the other power requirements of the colliery, this is by far the most economical means of supplying all the power needs of a colliery that has yet been devised. It is, however, adapted only to large operations, where turbines of considerable capacity are called for.

A FLYWHEEL EQUALIZING GENERATOR

A third innovation comparable to the above, but better adapted to small operations, is a modification of the "Ilgner"

system brought out in this country. The principal factor in an installation of this kind is shown in the illustration, Fig. 7, obtained through the courtesy of the Allis-Chalmers Company, Milwaukee. It is a flywheel equalizing generator. The generator shown has a normal capacity of 300 kw., at 550 volts, and 600 r.p.m. with an overload capacity of 800 kw., at 550 volts, for 15 sec., the speed in this time

not decreasing to less than 470 revolutions per minute.

This is an interpole-type machine and under normal conditions floats on the line as a motor, between the power house and the hoists, running at 600 r.p.m. When the loads come on above 600 amp. an automatic controller increases the magnetic field, thus causing the machine to operate as a generator and furnish the

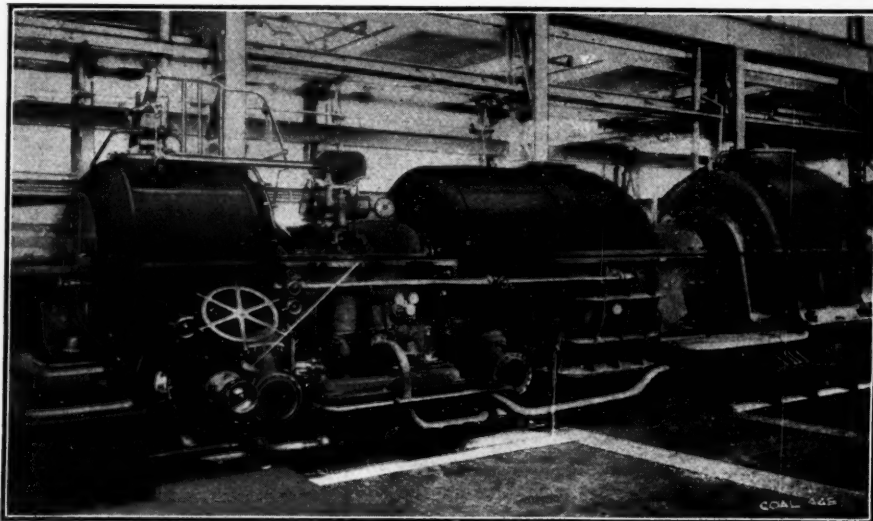


FIG. 5. CENTRAL-STATION STEAM TURBINE, KRUPP COLLIERIES

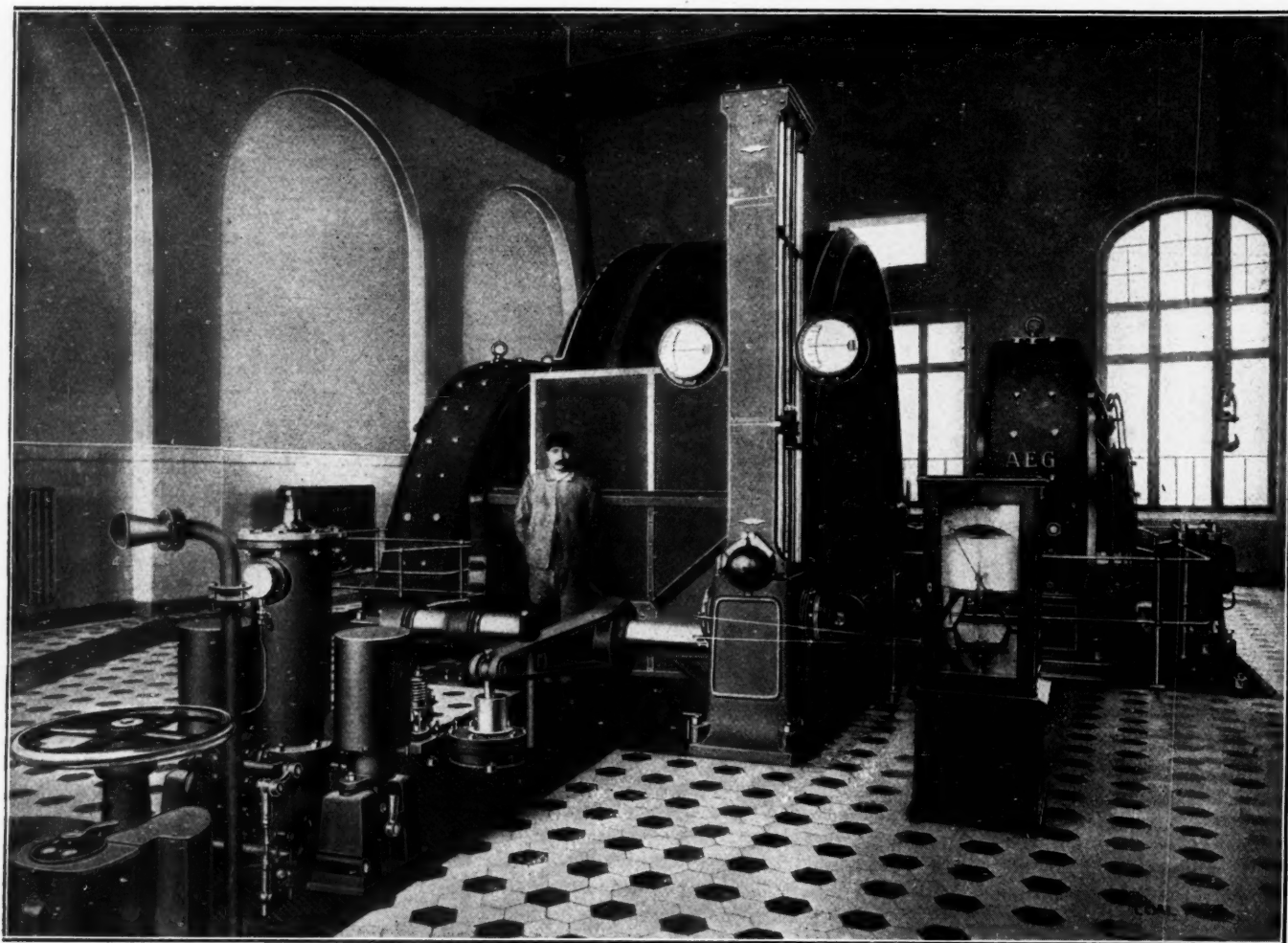


FIG. 6. SKIP HOIST OF A. E. G. ILGNER SYSTEM AT ROYAL COLLIERIES IN ZWECKEL, RHENISH, PRUSSIA

excess power which may be required above 600 amp. The controller is perfectly automatic in every respect, the only attention required of the operator being to close the field of the circuit breakers on starting up and open it on closing down.

The relays for controlling the strength

of the shunt field are several in number and set in such a way as to give a smooth acceleration at all times. A speed-limiting device which is adjusted to operate at 620 r.p.m., opens the circuit breaker in case the speed should, for any reason, go above this figure. Because of the great weight and the high speed of

the flywheel, the bearings are water cooled, as shown in Fig. 11.

STORAGE BATTERIES AND BOOSTERS

It is the judgment in Germany, rather more than in this country, that where direct current is available it should be used in preference to alternating current for hoisting service, a great point in its favor being its reliability. Acting on this principle, therefore, another system has come into use abroad which employs direct current together with storage batteries and reversible boosters, as shown in Fig. 2. In an installation of this kind the hoisting motor is divided into two units and controlled on the series-parallel principle, as used for electric traction, making practically a duplicate system throughout. It is always possible, by this method, to continue hoisting for a time should any part of the system break down, even in the event of the supply of current from the main power plant being cut off; also, a number of hoists can be made at a time when the generating units are not running, as during the night. However, a great objection to this system is its cost.

Still another system, which has been worked out in England, comprises a fly-

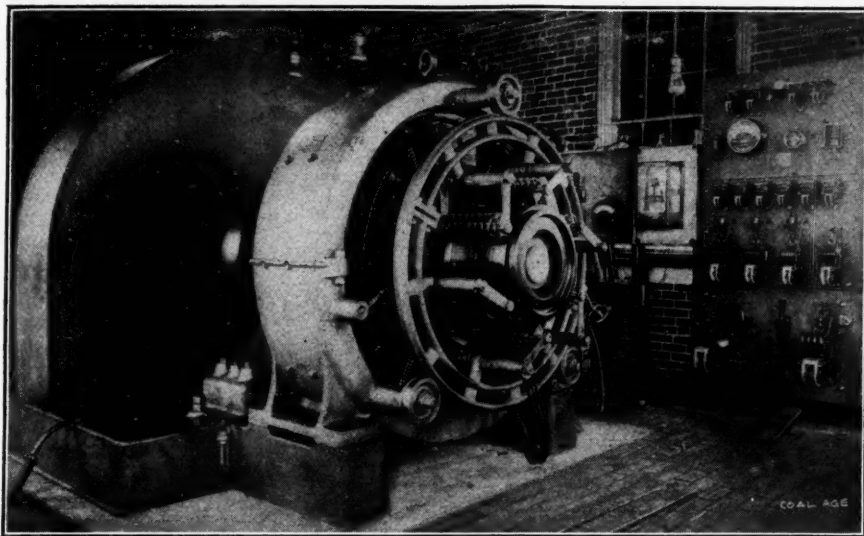


FIG. 7. FLYWHEEL EQUALIZING GENERATOR, SHOWING COMMUTATOR SIDE

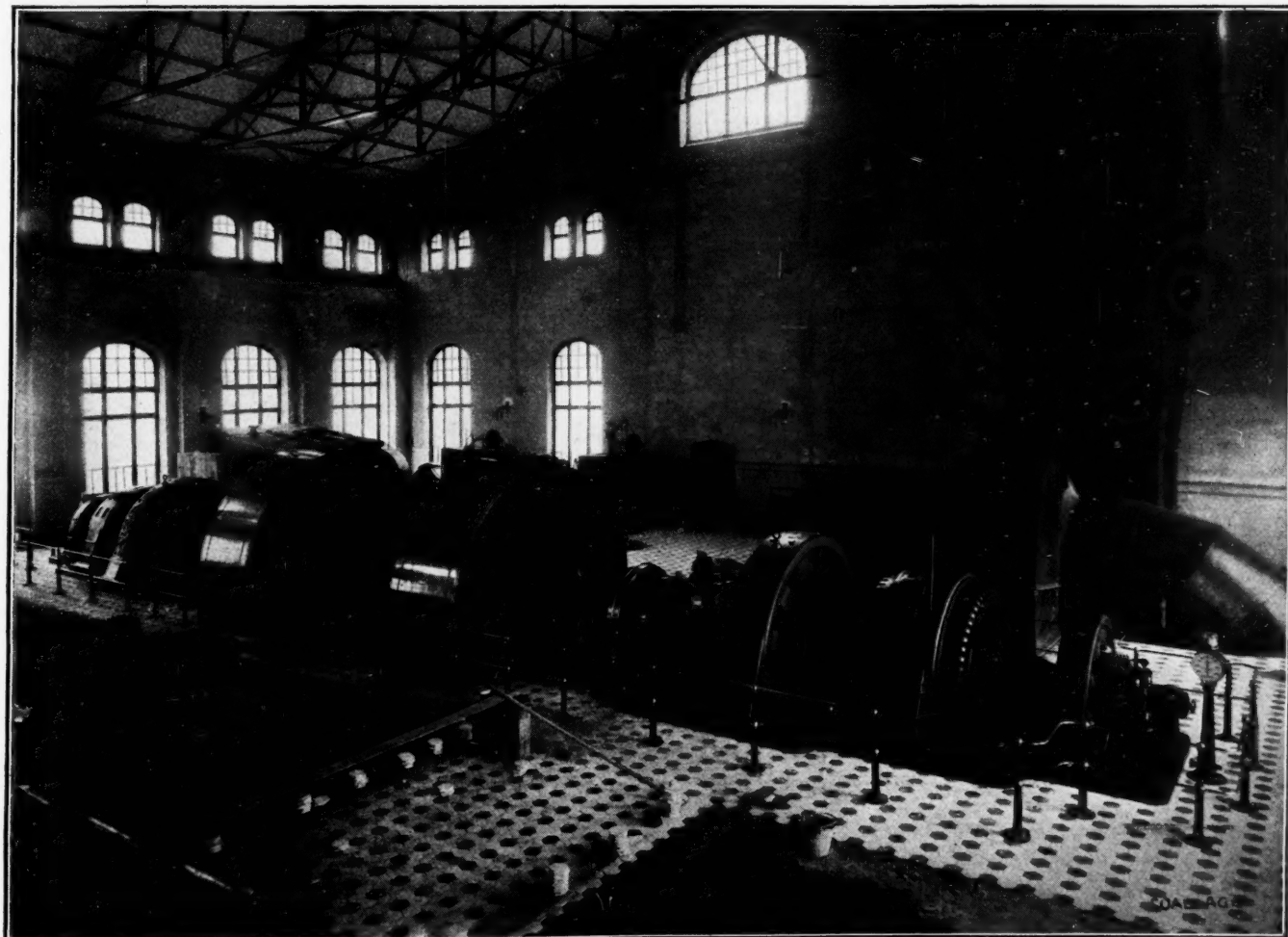


FIG. 8. DOUBLE MOTOR GENERATOR SET WITH HEAVY FLYWHEELS, FOR DEEP HOISTS, ROYAL COLLIERIES, ZWECKEL, RHENISH, PRUSSIA

wheel equalizing or balancing set connected in parallel with the hoisting motors across the supply mains. Of those systems which make a constant demand on the power plant this is probably the cheapest for most cases. A larger portion of the energy goes directly from the generator terminals to the hoisting motors and the equalizing set is called upon to supply only that portion of the peak load which is above the mean; therefore, this apparatus need be neither so large nor so costly as that in the "Ilgnier" system.

The arrangement also has greater claims to reliability, seeing that it is possible to hoist without the equalizing set. Another advantage, which will appeal to the electrician, lies in the better power factor which can be secured with this system. The disadvantages are: the large current which has to be handled by the controller, and the inability to store energy in the flywheel during retardation, which involves in some cases the use of either conical pulleys or balance ropes or wasteful braking.

A SIMPLE ARRANGEMENT

The simplest system of all is, of course, one in which the hoisting motors,

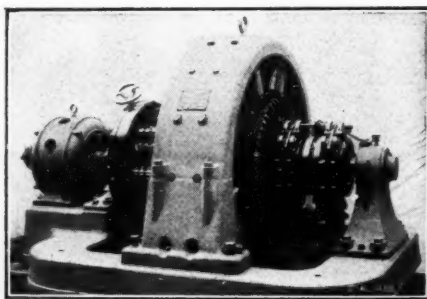


FIG. 9. ROTARY CONVERTER FOR COLLIERY SUBSTATION

either for direct or alternating current, are operated directly from the power plant, without any apparatus for equalizing the load and are controlled merely through resistance. This arrangement can be used in cases where the maximum pull of the hoists is well within the limit of the power available and the skips are hoisted in balance at relatively slow speed. Low initial cost and minimum attendance may also recommend it; but the system is exceedingly wasteful of energy.

Where direct current for hoisting and other service is used by a colliery obtaining its supply from a large central power station, as has come to be more and more the case of late years, it is customary to install a rotary converter, which acts as a motor-generator set in transforming to direct current the alternating current usually supplied by such a station. One of the latest types of this machine, built by Vickers, Ltd., Sheffield, England, is shown in Fig. 9.

With a rotary converter the transformation is effected in one machine, which is no larger than the direct-current generator of a motor-generator set of the same capacity would be and has no greater losses; hence all the losses in the

The advantages and disadvantages of the various methods of hoisting by means of electric motors as applied to colliery work are receiving careful attention from German engineers, and it is probable that, within a few years, the practice in

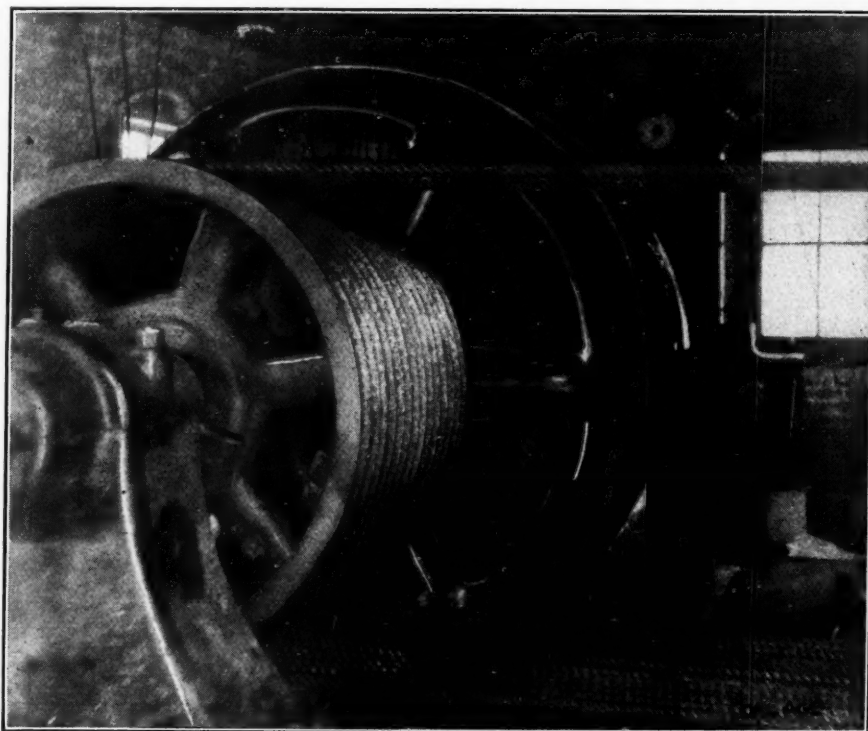


FIG. 10. SPECIAL ALTERNATING-CURRENT HOIST MOTOR, CASCADE SYSTEM

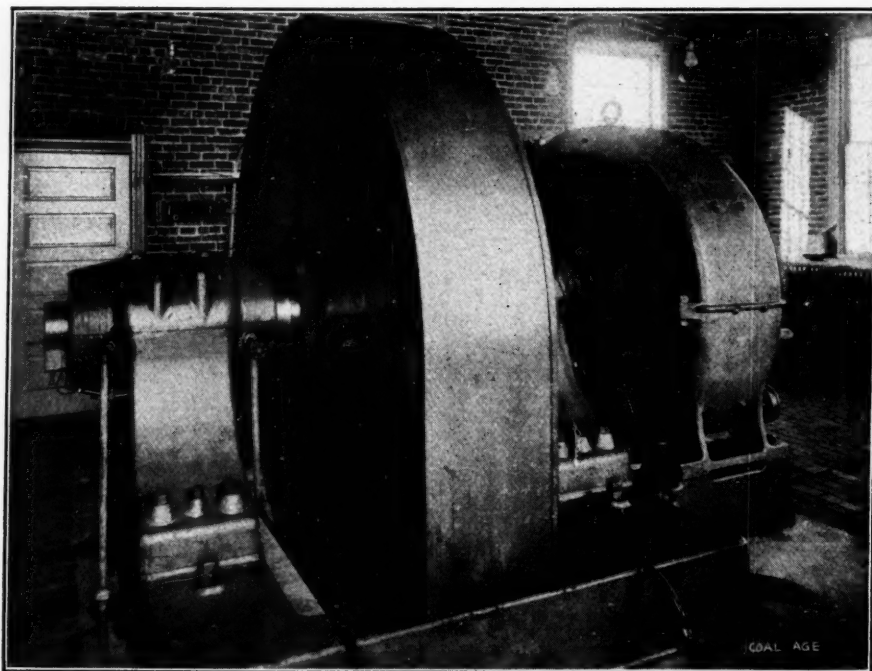


FIG. 11. FLYWHEEL EQUALIZING GENERATOR, SHOWING WATER-COOLED BEARINGS ON FLYWHEEL SIDE

motor are avoided and a much higher efficiency obtained. Where the load is fluctuating as in hoisting service, this machine operates to particular advantage, owing to its ability to carry heavy overloads.

Germany will be standardized along lines of proved economy. In England, recently, interest in electric hoists has been awakened and material progress may be looked for.

Manufacturer and Operator

By F. C. Albrecht *

It is universally realized that education must be a sort of continuous performance, because the moment any man or group of men forming an organization stop his or their education, that person's or organization's growth retards. The successful physician continues his studies; the successful lawyer does likewise; the same should be true of the engineer, be he mining, mechanical, civil or electrical. Education cannot be secured from books alone; it must also be obtained from practice and experience. The latter may be divided under two heads—that which we learn from our own efforts and that which we learn through the work of others. One man may have experience in one line, another man in some other line, and so on. To get the sum of all this experience, to secure a composite education, if I may so express myself, these men get together, assist each other, and thus increase the value and efficiency of all taking part in the discussion. When you teach others, you teach yourself; you broaden out; and the world admires the broad-gaged man, but has little or no use for the narrow-minded man.

The foregoing leads up to the fundamental reason for the organization of a mining institute. It is formed for the direct purpose of getting together, of helping each other, of improving the efficiency of its members, individually and collectively, for the purpose of progressing, and of bringing the art and science of mining as closely to the ideal as is possible.

BENEFIT TO THE MANUFACTURER

For this very reason the manufacturer takes part. He wishes the benefit of the operator's experience, that he may be able to make the machinery that they will require to get out coal; that the men whom he sends out may be educated in the things they are interested in; that he may become acquainted and familiar with mining conditions; that he may talk to them in their own terms and know what he is talking about; that he may know about the details of mining; and, in short, that manufacturer and operator may have confidence in each other.

One always prefers to deal with those whom he knows, with those in whom confidence can be placed; and by attending the institute and getting the ideas of the operators, he will be able to manufacture apparatus in line with their own suggestions. For, after all, it is the man who is using the apparatus who is in the best position to make intelligent criticism and suggestions. Constructive criticism is always appreciated. Not only that, but the manufacturer is enabled, in many cases, to anticipate the operator's wants

The operator and manufacturer should combine to establish standards for mining machinery. The purchase of power from central station plants is recommended for the independent operator.

*Industrial and power department, Westinghouse Electric and Manufacturing Company, Pittsburgh, Penn.

NOTE—Abstract of paper read before the winter meeting of the West Virginia Coal Mining Institute, Fairmont, W. Va., Dec. 4.

and requirements. This may not always be evident at once, because a good deal of work may first be required in the laboratory and experimental room, but it is a fact nevertheless.

BENEFIT TO THE OPERATOR

Aside from the above consideration, the manufacturer benefits the operator, in that the former has a varied experience derived in a broader field; some large manufacturing concerns, for instance, have representatives in all parts of the world. These representatives send in new ideas continually, which reach the engineering and publicity departments, and these departments act as a clearing house to disseminate the information received. So everybody is kept posted as to the latest engineering practice, is advised as to what data are available, and the manufacturers' representatives are glad to give information, if called upon to do so. If they cannot do it at first hand, they know where to get it. They are willing to give as well as receive.

Let us follow this particular line of thought a bit further. Take a large manufacturing company; it has representatives not only interested in and making a specialty of mining, but other representatives in many other industries as well, such as railways, lighting plants, steel mills, textile manufactories, etc. Does it not seem reasonable that many times some particular operation developing in one of these industries may be similar to that in another? That being the case, the solving of one problem often works out for the benefit of more than one industry.

An example of this is found in hoist service; many problems that present themselves in this particular branch of mining are similar to those which obtain in steel mills, dredging and other in-

dustries. Again, other problems are common to various industries, such as taking care of drop in voltage, power transmission, parallel operation of generators, motors and transformers and correction of power factor.

STANDARDIZATION OF EQUIPMENT

The matter of standardization of equipment, to my mind, offers a considerable field for discussion, but in order to be as brief as possible, I will confine myself to a few particular types of apparatus. To begin with, let us consider the mining locomotive.

If there is any part of his equipment in which the mine manager or superintendent is particularly interested, it is the locomotive, whether of the gathering or haulage type. This is the machine which gets out his coal, that must get it out efficiently and quickly, so that competition can be met, contracts secured and kept, and a profit made. And yet many times the air has been made blue because a mine was crippled owing to the breakdown of a locomotive when no spare locomotive or parts were on hand. Perhaps on occasions like this, it was necessary to wait some days or even weeks to get what was wanted and then the manufacturer was roundly berated.

Now then, let me speak plainly; if the operators could see the varied assortment of inquiries the manufacturer gets, they would cease to wonder why they cannot get every repair part as soon as they wish. If they could see, for instance, the varied track gages that are used, this, in itself, would explain much. Every conceivable gage is specified.

It would, of course, be sheer foolishness on my part to attempt to dictate just what track gages are to be used, but I do feel that it is not necessary to have as many different gages as are in use. I have seen cases where mines belonging to the same company with exactly similar operating conditions, had different track gages, with the result that the equipments were not interchangeable. I will admit that in at least two of these cases, this was due to one company taking over another; but, nevertheless, if there had been a certain standard for certain mining conditions, this complication would never have arisen. I, therefore, submit, for your earnest consideration, the subject of "standardization of gages," so that you may approach the results obtained by the railroads, who, at one time, had the same difficulties to contend with, and successfully overcame them.

Again, there are few operators who have not certain ideas of their own as to the proper construction of a locomotive, and yet many of these do not agree, although all are held by equally capable men.

Naturally, not all minds agree, never have and never will, but, still, I submit that some certain standards should be agreed upon and ask that you give this point consideration. The manufacturer will work with you toward this end at any time. When standards are adopted spare frames can be secured promptly and bumpers, brake riggings, spare parts in general, will be on hand when wanted.

COMPOSITE UNITS

We should likewise consider other equipment; for instance, pumps and fans. These should be brought more nearly to a standard. Here several different manufacturers are interested in each composite unit. The operator, pump and fan builder and the manufacturer of electrical apparatus should get together and definite speeds, gear ratios and speed variations should be given consideration. The overload capacities specified at present vary a great deal, due to the fact, as I understand it, that operators and fan manufacturers have different ideas regarding the factors of safety. In my opinion, the subject of standardization is a serious one and one that should receive careful consideration and thought.

Let us also consider briefly the "supply-man" proper—with his supplies, such as wheels, gaskets, couplers, trolley wire, trolleys, clamps, track ties, rope, mine timbers, drills, chains, oils, waste, lamps, hose, valves and fittings and so on. Let me tell you—there is not a better bunch of fellows to be found than these. They are always on the job—"they strive to please"—"no trouble to show goods." They are glad to let you know the latest development in their line. They are more than glad to receive your constructive criticism; to get your ideas and suggestions. They are live wires keeping you informed of the news and developments of the day. You are essential to them; they are essential to you; we are all essential to each other.

PURCHASE OF POWER BY SMALL OPERATORS

As concerns manufacturers, there is one who seems now to be coming into his own, and this is the manufacturer of electric current; or in other words, the central station. The growth of the central station is gratifying. The combining of small plants and consolidation of small companies has made the central power plant and resultant substations an absolute necessity. The centralization of power for the larger companies (the power house with its turbines, large transformers and switchboards, the substation with its motor-generator set or rotary converter) has proved a bonanza to the operations where it has been effected, by enabling them to cut down the cost of production. In fact, without this centralization they would not be able to stay in business.

But the central station which manufactures current to sell to consumers is a new feature in coal mining to which I desire to draw particular attention. It is this central station which is going to prove in the mining industry, as it has already in others, a godsend to the small operator. The small mining operation may not be in a position to put in a plant of its own, boilers, engine, generator and switchboard being too expensive, but by making use of the central station this problem is solved. There need be installed only a motor-generator set or a rotary converter with few accessories and the plant is equipped for operation. No extra labor is required, as a rule; but even if a substation attendant is needed, the expense is not so great as that of an engineer and fireman.

ADVANTAGES OF CENTRAL-STATION POWER

The advantages of central-station power are not by any means limited to mines which cannot afford to put in an isolated plant. Even where the plant could be put in, it is often preferable to buy power from the central station, the initial expense of the equipment being an important item, likewise the expense of labor for power-house attendants. Coal that would be used under the boilers for generating steam can be sold at a profit. These are three important arguments in favor of buying current from the central station; others may be mentioned as follows:

In laying out the plant, that is, the first installation, the question of future additions does not have to be taken into consideration to the extent that it would with an isolated plant. As regards future power, the central station will take care of that; that is what it is in business for.

Central-station service is absolutely reliable and is available at all times, either day or night. Elaborate precautions are taken to assure a continuous supply of current during every minute of the 24 hours. By reason of the high engineering skill employed in the operation of the central plant, the likelihood of a shut-down is remote. Furthermore, the small operator may not always have the best of electrical talent available. When purchasing power, he has at his disposal the combined engineering service of the central station, whose business it is to keep posted on electrical matters.

When power is purchased from a central station there are no preliminary processes such as raising steam for a steam engine or going through the numerous preparatory operations of getting the gas engine into commission. Central-station power and the substation, when required, are always ready and may be easily started, after which the power keeps at its work, just as long as it is needed, whether it be for a minute or for weeks.

PURCHASER PAYS ONLY FOR POWER RECEIVED

The user of electric power from a central station pays only for that which he uses, except that a "minimum" is sometimes specified. This minimum is usually exceeded in actual practice. He is in no way called upon to pay for bringing the electric supply to his plant, as the central station takes this expense.

Electric motors will stand large overloads for reasonable periods, and consequently, in times of great business activity, the plant may be forced to the limit of the capacity of the motors. The central-station service will take care of the demand for power, whatever that may be. Therefore, the power demand may be expanded or contracted, as business conditions warrant.

Owing to the many contingent, or rather, accruing advantages of purchased power from a central station, the cost per kilowatt should not always be the deciding factor. The gains due to this method of power service will compensate to a great extent for the increased cost, if possibly there is any.

While referring to rates, it will be found that the current manufacturer, the central station, has competition to meet, just as the coal or any other industry has, with the result that the central station must do the same as all manufacturers who need to furnish a better and cheaper product than their competitors in order to remain in the market. It must give good reliable service, at a proper market price. In that way, a reasonable rate can always be secured. The foregoing presents another phase of manufacturing for your consideration.

In giving illustrations, I have naturally given those applying to the electrical manufacturer, that being the industry with which I am most closely identified. However, any other manufacturer's representative could give just as good, if not better, illustrations.

Lamps in Deoxygenated Air

As the oxygen percentage in air diminishes, says Dr. Haldane, the flame of a candle or lamp is affected in two ways. In the first place the light emitted steadily diminishes. Roughly speaking, the light of a candle or lamp diminishes by 30 per cent. with a fall of 1 per cent. in the oxygen percentage, and the flame will no longer burn when the oxygen has fallen from the normal (20.93 per cent.) to about 17.5 per cent. A further effect is that the flame becomes less and less stable as the oxygen percentage diminishes, and it is more and more easily blown out by any chance draft or movement. To those who work or move about in "dull" air, this is painfully familiar; their lights are repeatedly extinguished.

Anthracite and Bituminous Mining

The preceding article of this series, which appeared in COAL AGE of Nov. 18, described the mining methods and conditions in the bituminous region of central Pennsylvania. These are in general characteristic of most of the mining regions in the Appalachian range.

The New River field of West Virginia is justly celebrated by reason of the exceptionally high-grade quality of the coal there found and mined in increasing quantities. The quality of this bituminous coal is unexcelled, and it is so well known in all of the Eastern and Western

By Eli T. Conner*

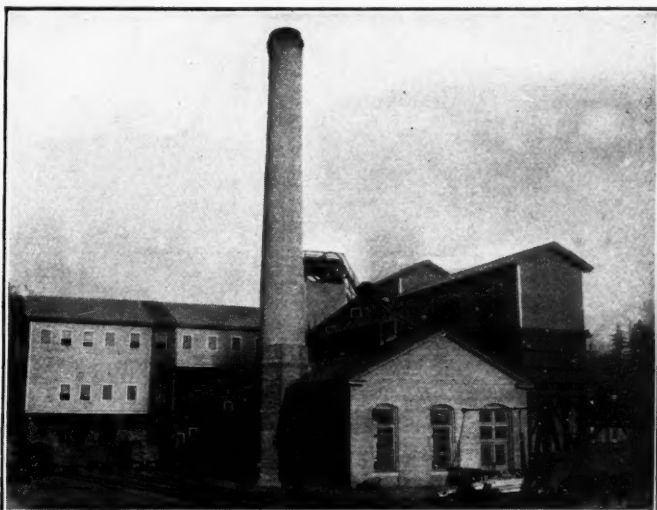
The methods of operating in West Virginia are illustrated by instances in New River field. Economy effected by mining machinery. The last of a series of articles by Mr. Conner.

*Consulting engineer, Real Estate Trust building, Philadelphia, Penn.

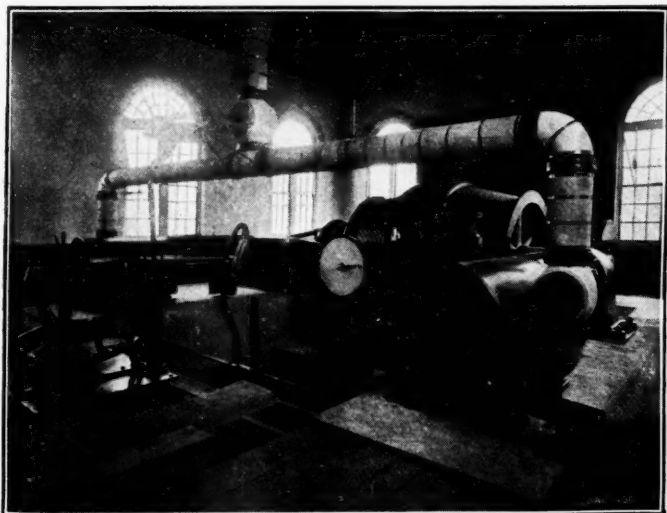
"Fire Creek," "Beckley" and "Sewell." These outcrop on New River cañon high in the hills above the river, but gradually depressing westward, they go under water a short distance west of Gauley bridge. A photograph is inserted with this article, showing one of the pioneer operations on New river and illustrating the method of lowering the coal in monitors or gunboats of about 5-ton capacity over a double-tracked inclined plane. This operation is located at Royal, in Raleigh county, and is similar to many other plants along the river.



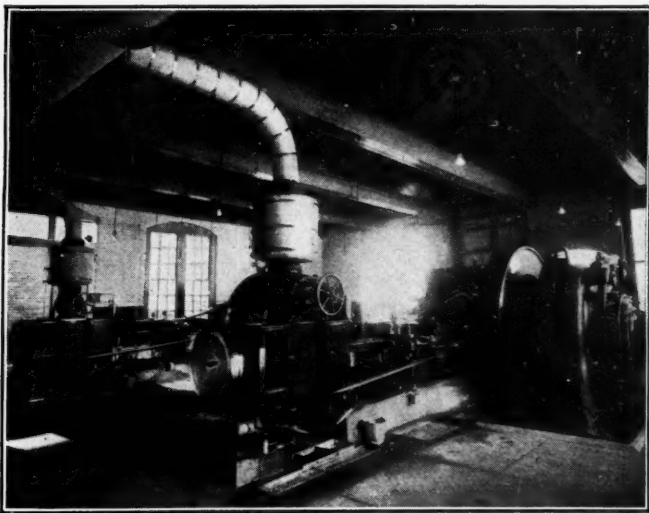
SUN NO. 2, NEW RIVER COLLIERIES COMPANY



POWER HOUSE AND TIPPLE, SUN NO. 2



FIRST-MOTION HOIST AT ECCLES SHAFT



ELECTRIC-POWER PLANT, SUN COLLIERY NO. 2

markets, as being in the same class with the famous Pocahontas and Georges Creek coals that no further reference need be made to its good qualities.

Mining was commenced in this region on the completion of the Chesapeake & Ohio Railroad to tidewater at Newport

News. The early developments were made along New river, which from Hinton westward to Gauley bridge, and beyond, flows through a deep cañon. Between the points mentioned, the beds of coal known as the New River series, as named in ascending sequence, are

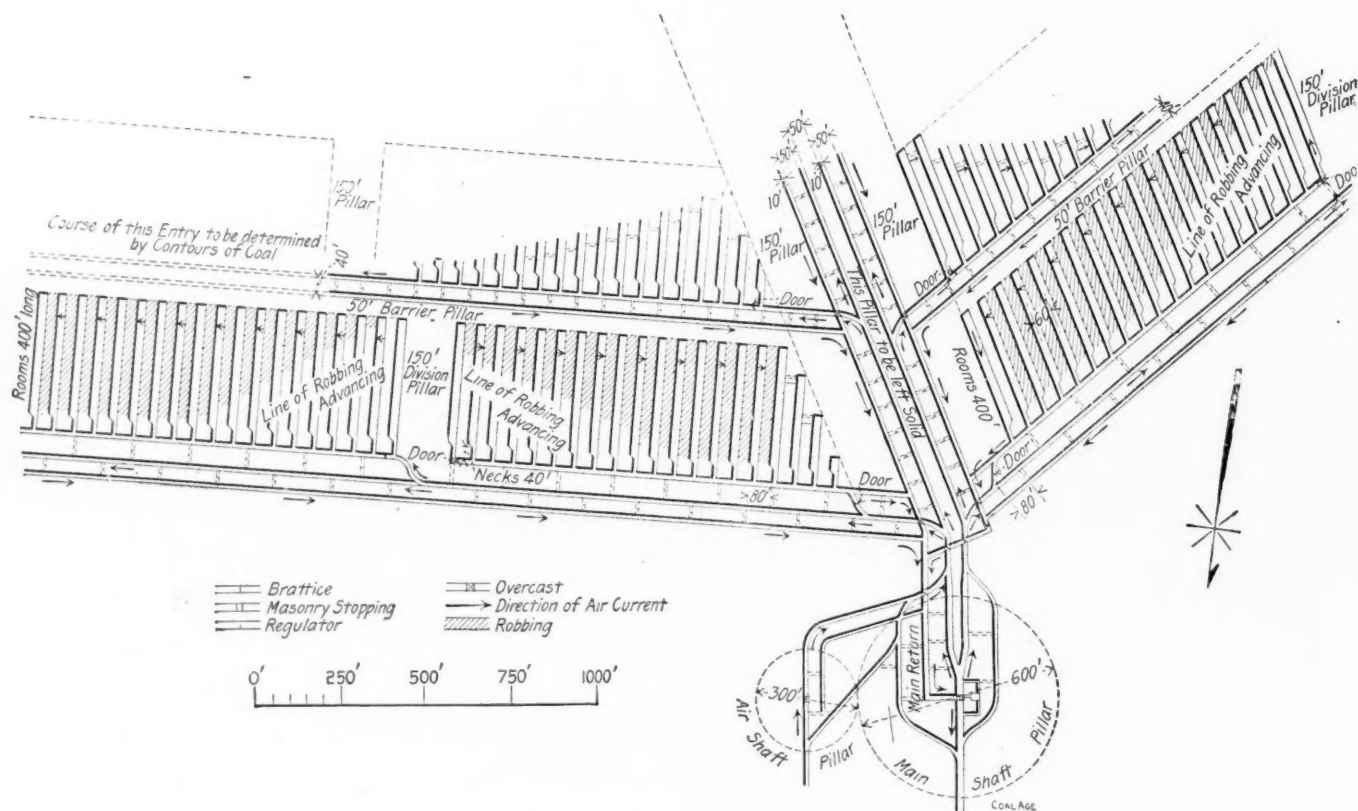
LATER DEVELOPMENTS ON BRANCH CREEKS

Within the past ten years, branch railroads have been constructed up the several tributary streams, the principal roads being on Piney and Loup creeks. Both streams empty into New river, Piney

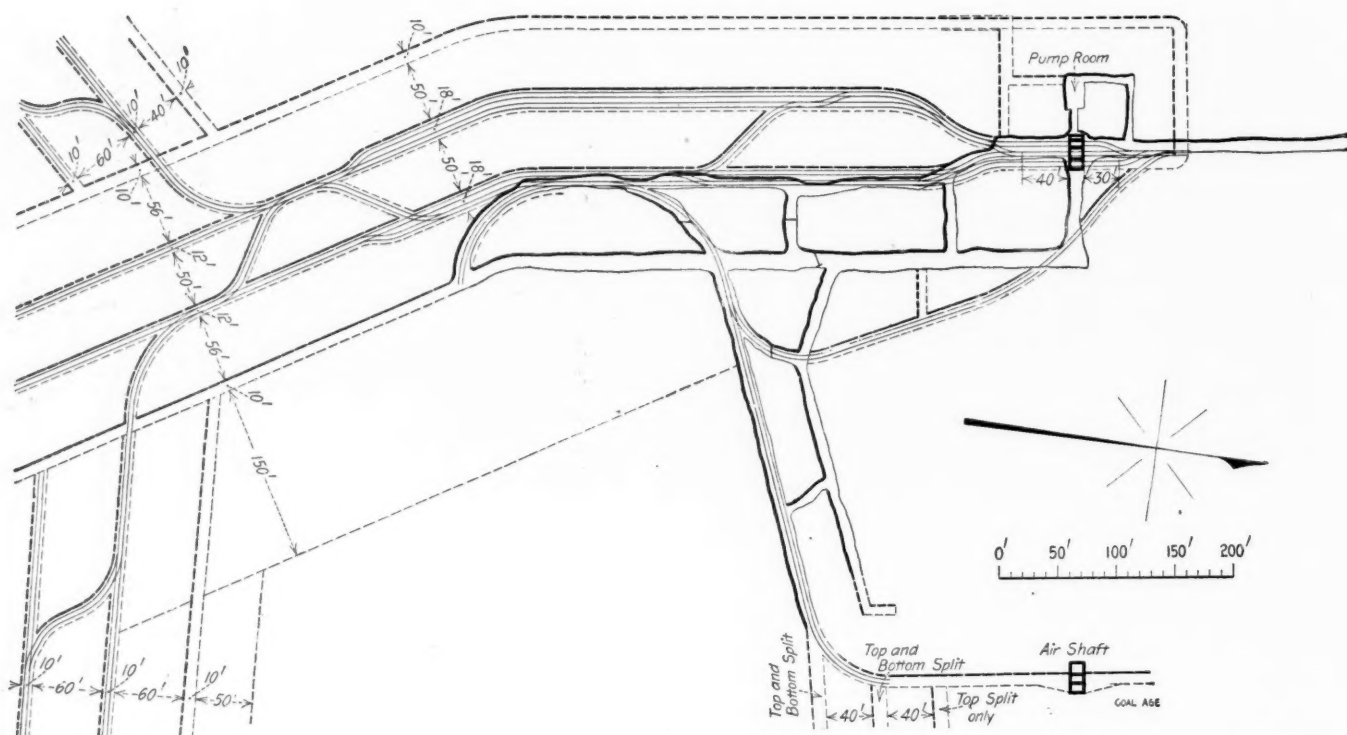
creek discharging its waters near Prince, and Loup creek emptying at Thurmond. Near the headwaters of these two streams, the coal beds are below water level, and many mining operations have lately been developed by slopes and shafts. One of the first of these shaft

operations was opened by the Sun Coal and Coke Company, at Sun, in Fayette county. This has been a large producer for a number of years. On account of the extent of the underground developments at this mine, it was found necessary to increase and enlarge the equip-

ment three years ago, at which time extensive additions and alterations were made, both on the surface and underground. Two photographs showing the completed surface plant at No. 2 mine are incorporated with this article. These serve to illustrate the type of construc-



IDEAL PROJECTION OF ECCLES NO. 11, NEW RIVER COLLIERIES COMPANY



PLAN OF SHAFT BOTTOM, ECCLES NO. 11, WEST VIRGINIA

tion that is being adopted by progressive corporations, not only here but elsewhere in this field. A photograph of the surface improvements at Eccles mine No. 1 is also incorporated for the same purpose.

MINING METHODS IN NEW RIVER REGION

A working drawing of an overcast at Eccles No. 11 shows that equal care is be-

economical within recent years to increase in large measure the proportion of machine mining. From personal experience here, as elsewhere, I believe the machine best suited for average conditions in this field is what is known as the "semi-longwall" or "short-wall" type of electrically actuated machine. To illustrate this point, I incorporate a state-

gross ton. The statement shows a decided economy in this department.

COAL CUT BY ELECTRICITY AND LOADED BY DAY LABORERS

		Amount	Cost per Ton
Cutting,	530 hours@30c.	159.00	0.0393
Scraping,	531 hours@20c.	106.20	0.0262
Trackmen,	255 hours@25c.	63.75	0.0158
Trackmen,	250 hours@20c.	50.00	0.0128
Shooting,	222 hours@25c.	55.50	0.0137
Slate,	2716 hours@20c.	543.20	0.1343
Loading,	3067 hours@20c.	613.40	0.1516
Foremen,	270 hours@30c.	81.00	0.0200
Total labor.....		\$1674.05	\$0.4137
Supplies.....		\$136.01	\$0.0336
Depreciation on machines...		36.00	0.0090
Interest 6% on \$3400.....		17.00	0.0042
Repairs and maintenance (est.).....		5.00	0.0012
Power.....		24.64	0.0060

4045 tons, 19 cwt., at total cost of..... \$1892.10 \$0.4677

The above cannot be taken as a typical or average statement, as the conditions at the operation referred to are much less favorable to pick mining than at most other operations in this field. The pick-mining rate along New river is 50 cents per gross ton, and at most of the operations on Piney creek and Loup creek it is 40c. per gross ton, as compared with 69c. in central Pennsylvania, so that the economy by the use of machines is much less than would appear from the figures above quoted. Nevertheless, the increased output possible by the installation of suitable mining machines, together with the economy effected, justifies their introduction at many operations.



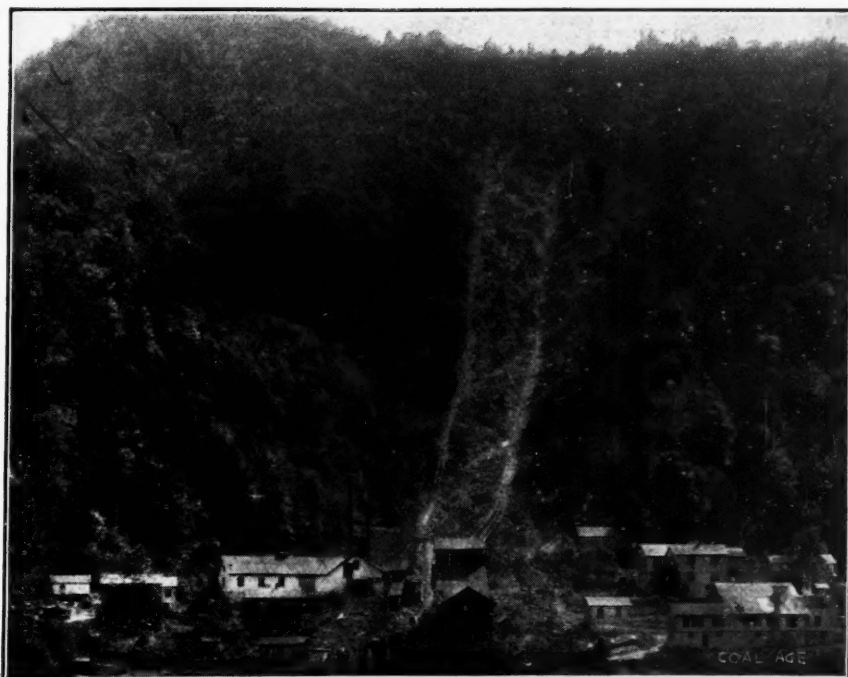
ECCLES NO. 1, SHOWING HEADFRAME AND POWER HOUSE

ing taken to make underground structures permanent. Much greater care is being exercised in recent years in the projection of underground work, ample provision being made for the proper protection of shafts and slopes, by leaving large and properly distributed coal pillars. As an illustration of this, a map is included showing the projection at Eccles mine No. 11. This map explains itself.

The room-and-pillar system of mining is almost universal in this field. There have been some attempts made to inaugurate longwall mining, with varying success, but this system has not been systematically and persistently adhered to. Judging from some experimental work, conducted under my supervision, I feel confident that the introduction of the longwall system at many of the mines in this field would result in decided commercial success, as well as in a greater yield per acre.

USE OF MINING MACHINES

The average thickness of the coal beds in the New River field exceeds that of the beds in the central Pennsylvania region, and consequently the pick-mining rate has for years been from 20 to 25 per cent. lower. Thus the necessity for the introduction of machines to effect economy in mining was not as forcibly impressed upon the operators as in Pennsylvania. Nevertheless it has been found



ROYAL COLLIERY, SHOWING INCLINE FOR MONITORS

ment showing the cost of machine mining with semi-longwall machines at an operation where, owing to the tough and "woody" nature of the coal, which necessitated paying the miners excessive "allowances," the average cost of mining with picks was between 60c. and 63c. per

SUMMARY OF PRECEDING ARTICLES

I would conclude this series of articles with a few general recommendations which I believe worthy of consideration:

First: A more general adoption of longwall mining, especially in thin seams.

Second: More extended introduction of machine mining.

Third: Substitution of electric locomotives or other suitable mechanical apparatus for transportation, not only on main entries, but in rooms.

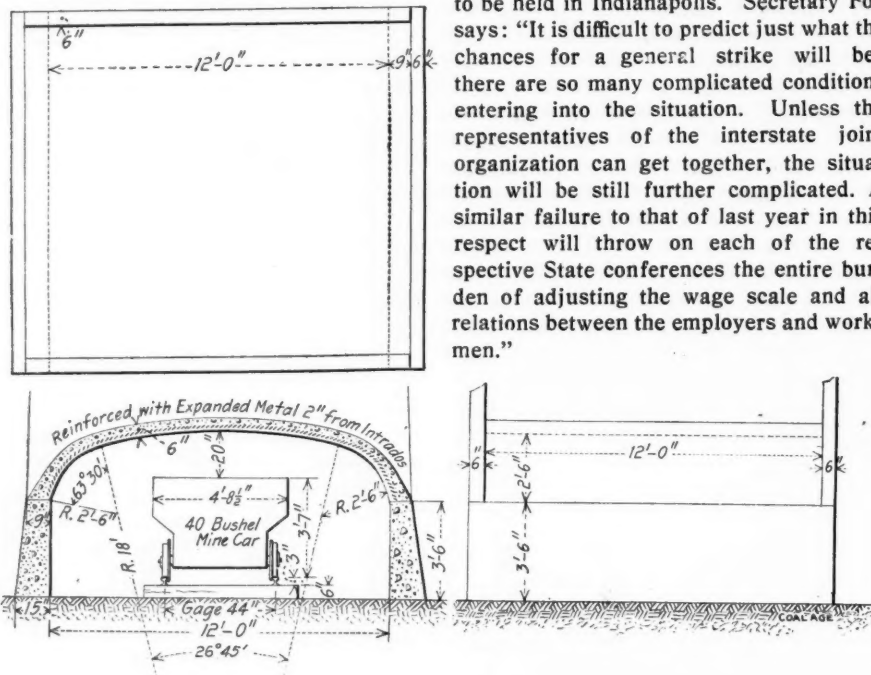
Fourth: Mine cars should be designed to fit thin beds of coal and should invariably be equipped with brakes.

Fifth: The waste and destruction of coal in the anthracite field, referred to in the first article of the series, should be given careful attention.

Sixth: Where stripping operations are conducted, the waste material removed should be pulverized and flushed into the

doubtless both a lesson learned from the recent strikes and a preparation for the anticipated struggle of the coming spring. He did not say what proposition the operators would submit at the joint conference, but it is known that a committee is now at work formulating a scheme to be followed out during the coming conferences.

The probability of a strike does not receive such ready indorsement by Secretary Charles Fox, of the Eleventh District United Mine Workers, although he admits there will be a stubborn fight in the State and national joint conferences and especially in the State scale convention, to be held in Indianapolis. Secretary Fox says: "It is difficult to predict just what the chances for a general strike will be; there are so many complicated conditions entering into the situation. Unless the representatives of the interstate joint organization can get together, the situation will be still further complicated. A similar failure to that of last year in this respect will throw on each of the respective State conferences the entire burden of adjusting the wage scale and all relations between the employers and workmen."



STANDARD OVERCAST OF NEW RIVER COLLIERIES COMPANY

mine openings, especially under valuable surface improvements, and, lastly, I think it an economic mistake to flush culm that will doubtless have a future value, into the mines where it will be irrecoverable.

Strike Outlook in Indiana

A widespread strike throughout the bituminous coalfields, which may include the anthracite field, when the time comes next April for the joint contracts between the miners and the operators, is predicted by Philip H. Penna, secretary of the Indiana Bituminous Coal Operators' Association. In a recent interview Mr. Penna said, "I don't know how we can escape a general strike all over the country when it comes to the making of new schedules of wages and terms of employment. However, the conditions growing out of a strike will not find the Indiana operators entirely unprepared."

Going on, Mr. Penna said that the recent adoption of a complete system of insurance against losses by strikes was

It is thoroughly agreed that there are many complicated elements entering into the coming controversy. The election of the miners' national officers; the expiration of the Toledo agreement governing conditions in Pennsylvania, Ohio, Indiana and Illinois; the expiration of the anthracite workers' agreement and of the State contracts in the bituminous field—all on March 31, 1912—will demand the settlement of wage scales and working conditions, which involve practically all phases of coal-mining work.

In Indiana, it is expected by operators and miners that there will be a hard fight over the question of "places" and the removal of pillars. The interpretation of the clause in the present Indiana agreement, which refers to these matters, led to one of the longest and most stubbornly contested strikes of recent years in this State. The trouble arose because of the demand that three places be assigned to two men when removing pillars in the mines. The operators insisted that the case was not in any way covered by the contract, and after weeks of dissension,

the matter was arbitrated and the men sent back to work under orders that no work at all should be done on the pillars until the next scale agreements were adopted. This leaves the question for settlement next spring.

There are other complicated questions of a technical and more or less detailed nature, on many of which a deadlock is expected. If the fears of Secretary Penna are realized as he now predicts, even the long and widespread strikes of the past year, such as those in Indiana, Illinois and other States will be eclipsed.

Alaska's High Grade Coals

Though something has been known of Alaska coal for more than 60 years, the amount of actual mining, according to the United States Geological Survey, has been insignificant. The total production since the Territory was acquired from Russia is less than 50,000 tons. This is all the more significant because during this time more than 1,500,000 tons of coal have been shipped into Alaska, and all but 20 per cent. of it was from foreign fields. The Bering River and Matanuska coalfields of Alaska are stated by Alfred H. Brooks, of the Geological Survey, in a recent report, to constitute the only known sources of high-grade coal near either the eastern or the western shore of the Pacific Ocean, unless such fuels may be had from the inland coalfield of China. They are, therefore, of great importance to the industries of the Pacific coast. From them must come the high-grade steaming and coking coals and anthracite needed by the growing population in the seaboard States. Unless they are utilized the manufacturing and smelting industries of that region and the ships of the American Navy in the Pacific must depend largely on foreign fields, except as coal may be brought around Cape Horn and through the Panama canal. Alaska's own need for high-grade coal can be supplied only from these two fields, unless it is furnished by such foreign fuel as is transported for a thousand miles or more.

Maryland an Early Coal Producer

Maryland was the second producer of coal in the United States and has mined a total of 161,224,007 short tons of coal, including the output for 1910. The first production, according to the U. S. Geological Survey, was 3000 tons, in 1820. Maryland's coal output has not been large as compared with that of the great coal States, but the increase has been steady. In 1870 the production was 1,819,824 tons, in 1900 it was 4,024,688 tons, and in 1910 it was 5,217,125 tons.

W. Va. Mining Institute Meeting

The winter meeting of the West Virginia Coal Mining Institute convened in Fairmont, W. Va., Monday, Dec. 4, at 2 p.m.

ADDRESS OF PRESIDENT HAAS

In opening the convention, President Haas said in part: Our institute is not a money-making proposition, nor was it so designed; however, the institute is in a prosperous condition and has exceeded the hopes and expectations of those who were instrumental in its inception. The measure of success of our work is the attention we attract from the mining professions and the interest inspired among ourselves in problems of common interest.

The nightmare, mining legislation, has been thrust before us again, not from within, but from the adjoining and neighboring State of Pennsylvania. It is not my intention to criticize the new Pennsylvania mining law at this time, but merely to bring forth a few facts and opinions on the mining question, which may be pertinent in comparison. Just recently, West Virginia as a coal-producing State, has been styled an economic blunder by some of our Pennsylvania friends; however, we may yet live by patterning her virtues and perhaps profit by her follies.

In my opinion, the mine law should be short and concise, so that people will learn it; it must be plain, in order to be understood; its enforcement must be rigid, so that the law will command respect. Facts that are contained in volumes of matter are rarely discovered; elaboration mystifies rather than exemplifies, and a law which is not enforced is ridiculed with common malpractice.

A CONSIDERATION OF MINE LAWS

It is a matter of regret that our institute has not entered into the consideration of certain features of mine laws. It is certainly the most suggestive and prolific field we have. I do not mean that this institute is to assume to dictate legislation, but I thoroughly believe that through our transactions, mining questions involved in the laws should be thoroughly elucidated, not only for our own information, but for those whose duty it is to make and enforce laws. There is no question but that simplicity and enforcement, together with excellence of personnel of inspection, are most effective in protection of life and property.

An example of what might be taken up in this institute is the question of ventilation. This is probably the oldest feature of all mining law. "Air for the miner," has been the constant cry, and, being a good thing, it has reached a point where the excess should be regulated. A new word, "over-ventilation," has entered recently into the coal miner's glossary.

Editorial Correspondence

The winter convention, held in Fairmont, was largely attended, and the papers read and discussed were of much interest.

The object then should be to define our work in a manner that would leave no room for argument, point out mining dangers, if there are any, and, in short, prepare the subject in such a way that should legislation be necessary, the people who make the laws may have available the best technical opinions of the State.

Following the president's address were a few words of welcome on behalf of the Fairmont Chamber of Commerce, delivered by Judge W. S. Haymond.

Five-minute talks were then given by Neil Robinson, Charleston, and Karl F. Schoew, mine inspector of the First West Virginia district. Mr. Schoew spoke of the benefits derived from the State examinations of mine foremen and the advisability of establishing a school of mines at the West Virginia University for instruction of practical miners.

Next followed an address by George T. Watson, vice-president, Consolidation Coal Company, Fairmont, who referred to the efforts of Pennsylvania operators to have the transportation rates on lake coal from the Pittsburgh district reduced to correspond with the rate (based on length of haul) on West Virginia coal to the lake ports.

[The Pennsylvania operators have testified before the Interstate Commerce Commission that the 88c. rate on coal shipped to the lakes is excessive, and that under such a condition Pennsylvania operators sell coal at a loss. The average distance at the 88c. rate is about 150 miles; the average distance from the southern part of West Virginia to the lakes is about 330 miles. The Pittsburgh men claimed that 88c. for a haul of 150 miles was too high, compared with 97c. for a haul of from 330 to 400 miles. Intimation has been given the shippers of the southern part of West Virginia that the rates would be advanced 9¼c. per ton. Such action would undoubtedly have a most adverse effect on the coal business in West Virginia. The operators in that State, market about 6,000,000 tons of lake coal each year, so the question is of great interest and importance to all who are engaged in mining West Virginia coal.—EDITOR.]

Following Mr. Watson, Ex-Governor A. B. Fleming gave an extemporaneous talk on the difficulties encountered in the development of the Fairmont coalfield. Further short addresses were made by Daniel Howard, Clarksburg, and J. B. Hanford, Morgantown.

Next in order was a paper read by F. C. Albrecht on "The Relationship of Manufacturer to Operator," which address appears on page 275 of this issue of COAL AGE.

W. R. Crane, dean of the School of Mines, Pennsylvania State College, State College, Penn., made the closing address of the afternoon, his subject being "A Method of Testing for Blackdamp." The simple apparatus used by Professor Crane in testing by this method was shown. It was stated that while there is a slight difference in the results obtained from this apparatus and laboratory tests of the gas, the difference is rarely over one-tenth of 1 per cent. Temperatures, it was stated, had little effect on the test, for when a mixture of gas is subjected to heat and expands, the relative gas percentage does not change. An abstract of Professor Crane's paper is printed herewith.

Method of Testing for Blackdamp

While the methods of testing for the various gases—common in mines have been improved until they have reached a high degree of perfection, yet there is one gas or, rather, combination of gases, namely, blackdamp, for which until recently there has been no satisfactory test. It is a description of an interesting apparatus for testing blackdamp which furnishes the subject of this paper. Owing to the fact that chemists occasionally and erroneously speak of carbon dioxide as blackdamp or chokedamp, a certain amount of confusion has arisen as to what blackdamp really is.

BLACKDAMP—A MIXTURE OF CARBON DIOXIDE AND NITROGEN

Blackdamp is composed of carbon dioxide and nitrogen. Both are inert gases and an excess of these has little effect upon respiration or lights except insofar as they replace the oxygen from the air, or otherwise reduce its percentage. The amount of carbon dioxide present in blackdamp ranges from 5 to 20 per cent., the remaining 95 to 80 per cent. being nitrogen.

Moisture also acts to extinguish a flame or to diminish the light it emits, and its effect is probably considerably more pronounced than that of nitrogen. Oxygen may be diminished from 20.93 per cent., the normal amount, to 15 per cent. with-

out injurious effects upon man, although a candle flame would be instantly extinguished by such a percentage. Roughly speaking, the light of a candle will be diminished by 30 per cent. with a fall of 1 per cent. in oxygen content and, strictly speaking, will be extinguished when there is only 17.5 per cent. oxygen present. Further, with the diminution in percentage of oxygen, the steadiness of the flame of a candle becomes less, until with "dull" air it is difficult to keep a light. It is upon the tendency of a light to go out that the test to be described is based.

BLACKDAMP TESTING APPARATUS

The apparatus for making the tests indicated above is exceedingly simple, consisting of a piece of glass tube and some small tapers or candles. The tube is graduated, from the bottom upward, in two columns, namely, in percentages of blackdamp beginning with zero and increasing to 10½ per cent., while for oxygen the initial percentage is 20.9. This decreases as we proceed upward to 18.7. Filling in the intermediate points of the graduations of the testing tube and arranging so as to show the relation existing between the percentage of blackdamp and oxygen, we have the following results:

Oxygen.....	20.9	20.7	20.5	20.3	20.1	19.9
Blackdamp....	0	1	2	3	4	5
Oxygen.....	19.7	19.5	19.25	19.0	18.8	18.7
Blackdamp....	6	7	8	9	10	10½

It will be noted that the 18.7 per cent. given as the lowest oxygen content of the air tested is approximately 1 per cent. above the point where a light is extinguished, and it might be inferred that the flame would not expire from such depletion. This is not the case, however, as the unstableness of the flame is a factor which must be considered. The draft produced by the burning taper tends to blow out the light, and according to the amount or percentage of oxygen present the flame is extinguished at a higher or lower point in the tube.

For convenience, the tube must not be too large, neither can it be too small, a certain relation existing between the size of the taper and the internal bore of the tube. If the taper is too large with respect to the tube there is danger of overheating and breakage. The size of the taper, therefore, really limits the minimum size of the tube, and as it is preferably carried in the pocket, convenience again limits the size to be used. Experience indicates that the most practical size is a tube ¾ in. to 1 in. internal diameter, the taper being about ⅛ in. to ¼ in. in diameter.

In testing, the lighted taper is introduced into the top of the tube and is gradually lowered until the flame becomes small, and on careful inspection the point where extinction takes place

can be detected with a surprising degree of accuracy.

MAINLY EXHIBITS DEPLETION OF OXYGEN

An objection that might be raised to this method of testing is that it does not indicate the presence of carbon monoxide and other inflammable gases. One cannot then be sure of the absence of such gases from the air tested unless absolutely no impurities are shown. Further, the air might contain other gases, as the fumes from explosives and underground fires, either alone or with chokedamp, and this even to a dangerous degree; the apparatus, therefore, would indicate but a certain percentage of blackdamp, and that well within the limit set for safety, which was 8 per cent. blackdamp, as recommended by the Royal Commission. In naked-light mines, firedamp and carbon monoxide are seldom present in any considerable quantities, and so would not influence to any great extent the results obtained.

The method described is both simple and accurate, which features are the two prime requisites for any apparatus to be used continuously and successfully by the mine officials. Any test requiring the use of complicated apparatus and considerable care in its use will not be looked upon with favor by those who are supposed to use it and will not, therefore, serve its purpose fully.

The above described method of testing for blackdamp was devised by J. S. Haldane, the English gas expert, and has been successfully employed by him and others in testing for blackdamp in English coal mines.

Further Proceedings of the West Virginia Institute

The Monday evening session of the West Virginia Coal Institute was devoted to hearing a talk by Dr. Thomas C. Hodges, president of the West Virginia University, on "Technical Education with Special References to Mining Interests," and a paper by Ex-Governor A. B. Fleming, on "A History of the Fairmont Region."

The second day of the institute meeting was taken up with the reading of several interesting papers, dealing with pertinent subjects. An abstract of the address by John Laing, chief mine inspector for West Virginia, on "A Mine Foreman," is published on this page. A valuable paper by James J. Marshall, chief engineer of the Loup Creek Colliery Company, Page, W. Va., on "The Recovery of Coal from the No. 2 Gas Seam in the Kanawha District," will appear in the Dec. 16 issue of COAL AGE. The fact that this latter paper does not appear in our issue this week is not the fault of the editors of COAL AGE nor of the author of the paper.

On Tuesday evening, a banquet was

tendered the institute by the Fairmont Chamber of Commerce. On Wednesday, the final day of the meeting, the entire time was given up to a tour of inspection of coal mines and industrial plants in the neighborhood of Fairmont.

The Mine Foreman

BY JOHN LAING*

Experience teaches us that the efficient mine foreman is the bone, sinew and muscle of the whole operation. It matters not what money has been spent for expert developing, engineering or equipping of the mine in a modern manner, if the man in charge of it is not endowed with common sense, a knowledge of human nature and the power to maintain discipline, successful operation is impossible. If I were asked to give the qualifications of a first-class foreman, I would say that he should be a man of good morals, interested in the welfare of the community in which he lives, who would show by his actions and demeanor that he is deserving of the highest respect, both from his employer and employees.

It has been truly said that a man is largely a product of his environment, but it is in the power of the efficient mine foreman to create, to a certain extent, the proper environment. According to the character of his work in this direction, so will be the atmosphere about his mine, and any workman who has had experience in mining knows that there is an element permeating the atmosphere that is either exhilarating or depressing.

THE MORAL INFLUENCE OF THE FOREMAN

I, myself, have come into contact with some of the unfavorable atmospheres to which I have referred. The mines so operated have been run by men who were more or less versed in mining and yet were unable to succeed because of their low moral principles. Their personal character so contaminated the moral atmosphere about them that it nullified their efforts. On the other hand, men less skilled in mining but of uplifting moral conceptions, have made conspicuous successes. There is a saying that "He who cannot govern himself, need hardly expect to govern others." And this government, in the case of a mine foreman, should extend, not only to himself, but to his household as well. I have seen instances of ill-governed households where a mine foreman permitted members of his family to interfere with the management of his business, thereby breeding discord and making harmonious operation impossible.

The great mistake that many owners of coal properties make is that when they

*Chief mine inspector, Charleston, W. Va.

NOTE—Abstract of paper read before the winter meeting of the West Virginia Coal Mining Institute, Fairmont, W. Va., Dec. 5, 1911.

hear of a man, at some distant colliery, who is making a success in operating his mine, they employ him at a large salary, without knowing anything about him or the conditions which were responsible for his success. If the facts had been ascertained, it might have been found that he knew nothing whatever of the essential parts of the work which he had, after engagement, to perform. If a detailed inquiry had been made into his qualifications, it might have been learned that the chief engineer, the general manager or some other person was responsible, rather than he, for the success of the operation that he had previously controlled. Hence, when left to plan for himself, he may prove an absolute failure.

THE FOREMAN NOT AN ENGINEER

On all coal properties before the permanent work is begun, the ground should be inspected carefully by a practical coal-mining engineer, and each entry, airway, crosscut, room, etc., should be designated on a development map or projection so that when the mine foreman comes to take charge of the mine he has a plan by which to work. That foreman should be held responsible only for the execution of the scheme as set forth on the map. Much as we would have it otherwise, it is nevertheless true that the average mine foreman is not capable of taking the property and of planning it successfully, and he needs the assistance out-

lined above. In the majority of cases, as soon as he becomes expert enough to plan and lay out work for himself, he is in demand elsewhere, and all that should be expected of a mine foreman is a supervision of his men and the execution of the work in accordance with a plan laid out for him.

What I desire to make plain is that the foreman is an executive, but not always an educated person. The wages paid such an official do not justify the acceptance of a subordinate position of this kind, by a man of technical training. A coal company should not expect from a mine foreman such a degree of training as it does not pay for.

Anthracite Coal Inspection

By Dennis Dorris*

Coal inspection in the anthracite regions is now reduced to an absolute science. In contrast to the early-day methods, when the inspector relied on his force of character to back up his rulings, laboratory and mechanical tests are now used, the accuracy of which is not questioned.

The duties of the present-day coal inspector reach out over a large space. A man in this position should be broad and convincing, and the absolute judge as to the quality of the preparation. When his decision is rendered, based on actual tests, no one questions his authority or the correctness of the test. Occasionally now you will meet a foreman who imagines the inspector is too severe and rigid in his classification, and endeavors to convey this impression to the superintendent, but that official, unlike in the early days, promptly waves him aside and advises him that the Inspector's word is final. By doing this, he realizes the necessity of protecting the consumer against such overzealous officials.

The managers and superintendents of today are the most vigorous expounders of the rights and needs of the consumer, and have done much to counteract the anti-colliery-inspector feeling which for years has been so detrimental to the coal business. They have learned the cost of ill will, and the profits of good will, in the sale of anthracite coal.

There is a rule governing the inspection of anthracite coal both for size and impurities. Each size is limited to a certain percentage of slate and bone, and when these percentages are exceeded, the coal is not considered merchantable and is promptly condemned and reprepared. It is, therefore, necessary that the breaker have machinery for the treatment of condemned coal.

RULES FOR INSPECTORS

Slate contains less than 40 per cent. fixed carbon, while bone contains between 40 and 65 per cent. None of the several sizes shall contain a mixture of larger size sufficiently great to render the coal objectionable, nor should there be a larger proportion of any smaller size than is usually present in good merchantable coal.

*Chief coal inspector, Susquehanna Coal Company.

NOTE—Abstract of paper presented at the meeting of Nanticoke District Mining Institute, Nov. 4, 1911.

The position of a coal inspector requires considerable diplomacy. He should exercise great care in his judgment of what he classifies as slate and bone, and he should cheerfully give the outside foreman any information in reference to the preparation, and endeavor to satisfy him as to the correctness of his tests.

The general appearance is the most important factor in the sale of domestic sizes. The burning qualities are seldom considered so long as it appears well. However, the steam sizes are sometimes considered on the analysis basis, so the ash question is becoming quite a proposition with large manufacturing concerns in the cities, as the disposition of the ash runs into quite an item during the year.

The Susquehanna Coal Company has erected and fitted up at a great expense a chemical laboratory at Nanticoke. Daily samples are taken as the coal flows

into the car from each steam size and kept in a separate box under lock and key until the end of each month. They are then taken to the laboratory to be tested. This keeps the standard of the market coal normal, as tests are continually being made to ascertain the heat units the coal contains.

Very frequently coal is condemned on account of its appearance, because it is not properly washed, thus losing its luster, but not its heat units. It is a difficult matter to convince the average consumer of this.

The management encourages its men to make improvements in the various lines that will better the preparation, and they have spared no expense in design or construction or equipment to make the different plants the best possible for the work to be done, in full realization of the fact that the consumer must be pleased. Careful consideration has been given to every detail connected with the preparation.

NOTES ON INSPECTING

The successful inspector makes frequent visits under the breaker where the coal is being loaded in order to guard against a poor preparation getting into the body of the car. He should give some attention to the bottoms of cars and insist upon their being cleaned of all foreign matter. The officials are continually drilling the inspectors upon the necessity of rejecting coal that is not fully up to the standard, as they realize that a poorly prepared product causes considerable annoyance, because the reputation of the coal is greatly lessened in the eyes of the trade.

The general appearance of the surface of a car where the inspector makes his examination by testing 100 lb. of material in different portions, decides him as to whether the coal is properly prepared. The dealer thoroughly scrutinizes

the surface of the car, and if it looks anyway suspicious, he will not accept it.

Coal which is drawn into a car entirely from one pocket, to which it was conveyed on one telegraph, if well prepared on the surface, can usually be assumed the same throughout the body of the car. But when more than one telegraph is depositing coal into a pocket, there is always danger of a poorer-quality coal getting into the body of the car which the inspector is unable to locate.

BREAKER MACHINERY

The Susquehanna Coal Company was among the first of the large companies to create the position of "Prepared Coal Man," whose duty is to increase, if possible, the prepared sizes by closely observing the condition in the different plants. Nothing has been overlooked to perfect processes which will produce the largest percentage of what is known as above pea size, especially stove and nut. The prepared sizes are those mostly consumed for domestic purposes. All other sizes, known as pea, buckwheat, rice and barley, might be called breakage, as they are not so desirable as the larger sizes.

Daily tests are being made on the speed of rolls and design of teeth and the result of tests made at one of the company's operations last week confirms the conclusion that low speed is an important factor in the economical roll operation. The ordinary direct-driven high-speed roller could not be satisfactorily run at a reduced speed because the change would involve the loss of crushing power, causing the roll to become choked with coal. To overcome this obstacle in changing the speed of the roll from 800 to 850 ft. per minute down to 300 ft. per minute, it was necessary to install the compound gearing and the experiments are gratifying to the officials. They are not stopping at this knowledge gained to further advance and improve conditions, but are sending experts into the mines and instructing the miners in the best method of shooting the coal.

The economical breaking of coal has been the subject of much serious consideration by those who are directly connected with the operations. Great stress has been laid upon the different types of mechanical pickers and also the proper construction of chutes. The breakage of coal by gravity may be attributed to the badly constructed chutes. The lesson has been learned that the proper chute is one without corners or sharp turns, around which the coal will slide without striking the sides, or dropping, which causes the breakage.

METHODS OF CLEANING

Much thought and concern is given the many different machines for cleaning coal. The spiral type will work

well when handling all dry, or all wet coal, but will not give good results on a mixture of both. The falling of the coal from the spiral plates to the coal chutes causes a loss in breakage, and it requires considerable attention in order to prevent a large proportion of good coal going with the refuse, which would result in the reduction of the "mine car yield."

The mud-screen product contains a high percentage of flat material, which is objectionable to the average consumer, but does not materially effect the burning qualities of the coal. One type has been installed, known as the Norman picker, which consists of long rolls geared together, and revolving in the same direction, with a narrow opening, which the more cubical pieces of coal slide over, allowing the flat material to fall through. This finally may be cleaned of impurities in a separate jig and broken down to one of the smaller sizes and rescreened.

Careful consideration and attention is given the work of loading coal into the cars ready for consignment. The object desired is to reduce the high velocity of the coal by gently conveying it into the car from the lip screens with as much careful handling as possible in order to eliminate an excessive amount of breakage. This has been overlooked by a great many dealers when the coal reaches its destination.

THE CULM BANKS

The increasing demand for steam sizes within the last four or five years has made it necessary for the operators to attack the culm banks, formerly regarded as worthless refuse, which are yielding a surprising percentage of steam sizes. These mountains of coal throughout the anthracite regions are memories of the time when anthracite was cheaper and more plentiful than it will ever be again.

In the early days of coal mining in Pennsylvania, it was imagined that the newly discovered stores of anthracite were inexhaustible. Naturally the methods adopted for getting it out were crude and those engaged in the industry threw away the steam sizes, which today are competing with the bituminous coal. It was cheaper to reject such material because there was plenty more at hand, and it paid better to go after the big pieces known as lump. This material that the operators considered worthless built the large coal mountains which at the present time when steam sizes are becoming more and more precious are being systematically worked over.

Millions of tons of coal have been recovered in the past four or five years from dirt banks in the anthracite region. It is plainly realized that they are giving up their merchantable coal at a rapid rate; in fact, they are fast disappearing and only a small fraction remains.

British Columbia Coal Strike

After much negotiation between representatives of the Western Coal Operators' Association and District No. 18, United Mine Workers of America, practically all the matters in dispute have been settled, and an agreement has been signed. This agreement contains an exhaustive schedule covering the numerous points relative to which there has been divergence of opinion, and it fixes the basis upon which the coal mines of southeastern British Columbia and Alberta are to be operated during a period to expire on March 31, 1915.

Before the agreement was signed on behalf of the United Mine Workers, a referendum was made to the men. The votes cast by members of 20 locals numbered 3206 in all; of these 2214 were in favor of acceptance of the agreement and returning to work under its conditions, 953 were against it, and 39 were spoiled ballots.

Agreement was reached along the lines of the general understanding with the Hon. Robert Rogers, minister of the interior for Canada, who brought the parties together, after a long period during which no definite move was made in the direction of settling their differences. The general terms and provisions are substantially as follows:

PROVISIONS OF AGREEMENT

An open shop is conceded to the operators and a nondiscrimination clause inserted in the same, similar to the one on file with the Department of Labor at Ottawa. A uniform wage scale shall apply to all mines in the Association; said scale to be the scale of the Western Coal Operators' Association of the last agreement with the increased percentage provided by Dr. Gordon, added.

Contract rates to be the same as provided in the last agreement with the following exceptions: 1. An increase of 3 per cent. in contract rates at Lethbridge, Alberta. 2. A differential of five cents to seven cents per ton on all pillars at present without a differential, the application to be made by mutual consent. 3. An adjustment of the contract rates at Lille mines, Alberta, so as to make the rate proportionate to the thickness of the seams.

The operators agree to make deductions from the wages of members of the union of amounts for which they receive definite orders from the individuals, with a specified sum as the limit of any deduction. The management of the mines is to be fully vested in the various companies.

The total number of colliery employees affected by the strike, which lasted seven months, has been variously stated as 5000 to 7000; those who have been out of work have probably numbered between 4000 and 6000.

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COAL AGE

Overcast Design

It is customary in designing concrete overcasts to plan them as if the sole considerations were self support, and the erection of the lightest possible separation which will be permanent and impervious to air between the upper and lower airways. They are therefore built with all necessary reinforcement on the lower edge of the beam or on the intrados of the arch. But if overcasts are to be resistant to explosions, they must be made heavier and reinforced on the upper edge or on the extrados also. It may be pointed out that overcasts, in the form of arches, are particularly weak in opposing bursting strains from the lower road, not only because of the reinforcement being on the underside but because the concrete, being then wholly in tension, is not well fitted to aid in resisting such pressures.

In the Bruceton mine test, an opportunity was given to observe the action of concrete exposed to explosive violence. Much of the mine was lined with 9 in. of concrete, the sides being reinforced by $\frac{1}{4}$ -in. round bars. In the arched roof this was increased to $\frac{1}{2}$ in., the bars being square. The concreting does not appear to have been made to fit up tightly to the roof, so that when the explosions took place, the arch over the roadway was broken and the upper half of the so called "lining" lifted. In one case the roof was raised in the air so high that a stick, a piece of bark and a fragment of string from a sand sack interposed themselves while the lining was still in flight. The fracture in this case was well below the spring of the arch.

The designers of overcasts have in some cases made the concrete arches of air bridges only 6 in. thick, the downward weight being about 75 pounds per square foot.

The pressure obtained in the Bruceton gallery, in the inner instrument chamber was over 50 lb. per sq.in. The evidences of violence were less marked at that point than in the oblique gallery, and it is not unreasonable to believe that pres-

ures normal to the line of the blast may approach 75 lb. per sq.in., or 144 times those imposed by the dead weight of the arch.

In this connection we must recall the narrowness of the explosions gallery, which was only 75 in. wide. It would not be hard to find many air bridges twice as long and only 6 in. instead of 9 in. deep. Such overcasts must be regarded as likely to be resistant only to light gas explosions. A coal-dust explosion would certainly sweep them away. Their appearance and durability may excite confidence, but they cannot be relied on in a catastrophe.

The arch of an ideal overcast built to resist explosive violence should be of the shape of an x , set on its side with the upper limbs turned into a plane at right angles to the lower. The reinforcement should be carried from the extrados upward, through the curtain walls, which reach from the upper edge of the arching to the roof of the lower airway.

In fact it is growing evident that a crossing with an interval of solid rock between the airways is the only economic type of air bridge which may be relied on to be invulnerable to forces such as these.

The Human Element

Although COAL AGE is less than two months old, we have already recorded three serious coal-mine explosions. Practically all of the recent accidents have occurred in mines designed according to modern ideas, and believed to be safe, as coal mines go.

We invariably read the same old story of the model mine blowing up. You would almost be led to believe from the way the daily press reports such disasters that the modern, well planned operation is a mistaken departure in recent mining practice.

The closer we investigate mine explosions, the more certain it appears that the thing to be dreaded is the human element. Careless and vicious men are sure to find their way into the best of mines, and

when the workings are reported as unusually safe, the wall of caution that naturally surrounds the man who digs coal is torn down completely.

It is impossible to police a mine so the men cannot act on their own responsibility, and it is consequently true that coal workings are only as safe as the most ignorant or careless employee makes them.

Of course, we concede that when a mine management takes all possible precautions to avoid the occurrence of danger, the liability risk is greatly reduced. But the surest way to remove the likelihood of accident is to educate the miners themselves. If they do not comprehend the dangers that surround them, how can they be expected to act with caution in the routine of daily work?

Miners' Indemnity

The method by which equal protection can be afforded alike to the injured miner and his employing operator forms a problem of national importance. Many defendants have been severely mulcted in liability actions where the preponderance of evidence was in their favor, since jurors are often (perhaps unconsciously) prejudiced against corporations.

On the other hand, the solicitor for retainers in cases of personal injury is a baleful reality. Much unnecessary litigation is due to his activities. These bring additional burdens on taxpayers, yet it is a notorious fact that only a small proportion of the award for damages ever reaches the plaintiff. Such cases are also not infrequently prolific of perjury and subornation.

One legislature enacted a law (since declared unconstitutional) creating a fund, at the expense of the operators, for the benefit of the victims of mine accidents. Besides participating in the benefits of this fund, the right was reserved to the employee to bring action for additional damages. This scheme not only failed to relieve the taxpayer from the continual burden of prolonged legal actions, but was, moreover, clearly illegal, since it compelled the operator, who was successfully prosecuted, to pay the amount of liability twice.

It is a matter of common knowledge that our present systems of obtaining compensation for damages have brought about conditions demanding annulment of these methods of procedure. But it is

contrary to the fundamental principles of our constitution that changes in these systems be made which do not give equal rights to all concerned.

The Canary Bird

The use of the canary for measuring the safe resistance of a man to carbon monoxide poisoning in mine rescue and recovery work after an explosion or a fire, is not universal, but seems to have been accepted without original experimentation by the Bureau of Mines. One is tempted to inquire whether investigation might not reveal a bird or a mammal having a distinct superiority to the canary.

The mouse still has its advocates but its marked tendency to sulk in the corner of the cage in which it is carried makes it difficult to tell whether its inaction is due to atmospheric causes or to fear.

The canary, on the other hand, is a restless bird. Unceasingly preening its feathers, sharpening its beak, bursting into song, reversing, moving sideways, balancing on one foot, listening with rapt attention and appropriate posture, it is never still, unless sick. Its activity is a prompt and unfailing measure of its physical condition.

Thus temperamentally, the canary is the best of indicators, but without pretending to exact zoölogic knowledge, it does appear that his lung capacity is large and his blood content small. In fact the canary is the result of a long process of selection, the requirements of which were that the lungs should be strong, the vocal organs musical and that the color should be uniformly a brilliant yellow.

But large lungs, which are but large pumps filling the blood with air, are not of advantage where the air to be breathed is full of poison. Likewise, the small blood content of a canary is not desirable because the blood absorbs all the poisons and speedily reaches saturation point.

Doctor Haldane states that a mouse has only one-twentieth part of the resistance of a normally resistant man when exposed to an atmosphere impregnated with carbon monoxide. Many will recall how G. A. Burrell entered the glass box in Forbes Field at the recent Pittsburg Mine Safety Demonstration with a cage of canaries; that after these canaries had succumbed to the gas, other canaries

were handed in with like result. When they succumbed, Mr. Burrell crawled out of the box unaffected, having successfully resisted an exposure equal to two canary units. Let it be recalled that he is a scholar and not a physical worker, and that it is not likely that as far as blood capacity is concerned, he is capable of the normal resistance of the ordinary mine rescue-man, but probably as he was not working or walking when in the glass cage, and as moreover his lungs have not been enlarged by toil, his toxic endurance was as high as that of a more robust man who might have to labor in such gas.

Though the canary be regarded as an inadequate standard of resistance, no brief is held for any other bird or mammal. The only suggestion made is that the Bureau should not rest content believing the canary is the *avis rara* long desired. One recalls perching birds, silent but active, whose blood content should surely be greater and whose lung capacity would not, in all probability, be proportionately large.

Nor is it here counseled that rescue parties venture beyond the "call of the canary bird" if one might so express the mute appeal expressed by its spreading feet, trembling legs and helpless fall to unconsciousness. To continue to advance beyond the point marked by the collapse of the bird is to submit oneself to unknown hazards. But because the indication furnished by the canary is so inadequate, it will always be customary for bold men to disregard warnings and go ahead braving conditions, of the nature of which they know nothing. The canary bird furnishes a too early warning and like the shepherd who called "Wolf! Wolf!" when there was no wolf, the bird is likely to warn to no purpose.

It might be suggested that hemoglobin kept in a vacuum till used, or some other chemical, arranged to circulate in the air of the mine, might furnish a directly or indirectly observable measure of the increase in poisoning from noxious gases. There are difficulties in making observations in the mines, which militate against this proposal, the discoloration of the hemoglobin, for instance, being difficult to observe in the dim light which the lamps supply. But if a chemical test is impracticable, it is still permissible to suggest that another animal be the color-bearer in the work of rescue.

INQUIRIES of GENERAL INTEREST

A Page Devoted to Those who want Information. All Questions must be Accompanied by the Name and Address of Inquirer

Testing for Gas in Mines

How is gas found with a safety lamp in a mine? How is the percentage of gas present in the mine air determined?

GEORGE H. WHITE.

Pittsburg, Kan.

Marsh gas is detected in mines by carefully observing the appearance and action of the flame of a safety lamp when the latter is exposed to an atmosphere

of the safety lamp and vaporized. In this inner zone *A* there is not sufficient air (oxygen) to burn the combustible vapors and carbon. They are heated to a high temperature in this zone, however, by the combustion going on in the next or middle zone *B*.

The zone *B* is the luminous zone where the vapors and carbon, having become mixed with sufficient air, are burned. The combustion in this middle zone is not complete since the air supply is limited, compared with the supply of combustible matter. The particles of carbon are rendered incandescent by the heat of the combustion of the vaporous hydrocarbons. Much carbon monoxide (CO) is formed and some of the un-

THE FLAME TEST FOR GAS

In making what is called the *flame test* for gas it is the outer envelop or non-luminous zone that forms what is called the *flame cap*. This cap is hard to see because of the brightness of the flame, and for this reason it is generally customary for the fireboss to draw down the flame of his lamp to the smallest possible size, which is known as testing with the reduced flame. Some firebosses, however, prefer to test with the normal working flame, by observing the growing height of the flame as the quantity of gas present in the air increases, and also the unsteady action of the flame, in gas.

In the flame test, the flame cap or gas cap is formed by the burning of the gas present in the air surrounding the flame. There may not be sufficient gas in the air to form an inflammable mixture that would burn alone; but in contact with the lamp flame this small amount of gas assists the combustion in the outer zone and increases the height of the tip or flame cap. It is this pale-blue cap,

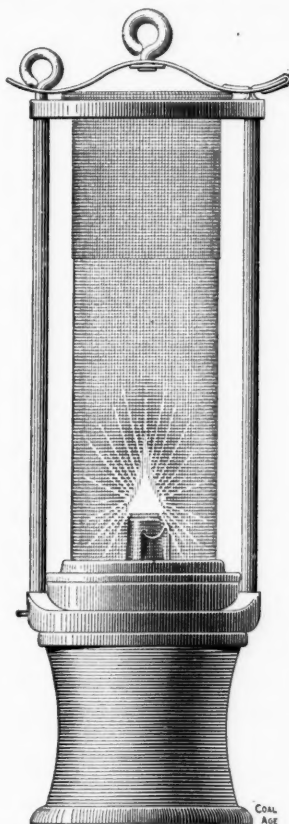


FIG. 1. DAVY LAMP IN GAS, SHOWING FLAME CAP

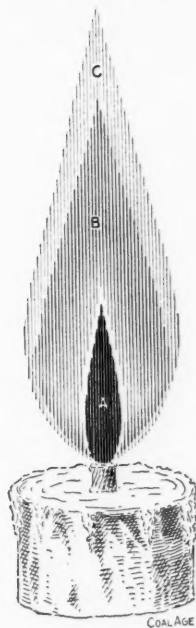


FIG. 2. CANDLE FLAME, SHOWING ZONES IN FLAME

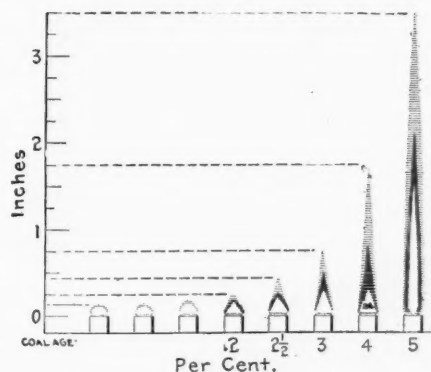


FIG. 3. SHOWING HEIGHTS OF FLAME CAP FOR DIFFERENT PERCENTAGES OF GAS

containing gas. Testing for gas is a much more delicate operation than is generally regarded by the average fireboss. In order to make a reliable test one must thoroughly understand the structure of flame.

THE FLAME OF A CANDLE

It is necessary to study the simple structure of a candle flame as shown in Fig. 2, where it is readily seen there are three zones *A*, *B* and *C*. The inner dark zone *A* consists of gaseous or vaporous hydrocarbons and carbon drawn up through the wick in much the same manner as the oil is drawn up through the wick

burned carbon escapes as smoke at the tip of the blaze.

The outer zone *C* is a nonluminous envelop, which surrounds the entire flame and forms a tip surmounting the same. In this zone there is a plentiful air supply; the combustible is the carbon monoxide (CO) of the middle zone *B*, which is here burned to carbon dioxide (CO₂). This combustion produces great heat but no light, which depends on the incandescent carbon particles in the middle zone. These particles can not exist in the outer zone *C*, because of the large supply of air whereby they are consumed.

which surmounts the lamp flame, as shown in Fig. 3 that indicates the presence of gas in the mine air. Fig. 3 shows a gas cap on the flame of an unbonneted Davy lamp. The flame of this lamp was first drawn down so that it was only one-eighth inch in height, but the gas in the air has not only formed the cap shown, but has also increased the height of the original flame or luminous portion as shown in the figure.

Many firebosses have difficulty in discerning this cap with certainty. Some fail to see any cap till the percentage of gas is very high, while others imagine they see a cap when no cap is formed, but

what is seen is a reflection merely of the flame itself or an hallucination.

HIGHT OF FLAME CAP DETERMINES PERCENTAGE OF GAS

Approximately the percentage of gas is estimated by the hight of the flame cap. The fireboss here does a good deal of wild guessing and scarcely any two estimates agree. The work requires good eyesight and not only that but good judgment besides. A magnifying glass or strong eye-glasses help much in observing the flame cap in a lamp.

Other gases mixed with marsh gas affect the formation of the cap; and much experience is often necessary before one is able to make accurate tests, under the changing conditions in mines. Olefiant gas when present renders the observation more difficult. In this case, seemingly, no cap is formed till the mixture approaches the explosive point. This gas disturbs the flame more than pure marsh gas. Carbon dioxide dims the flame and destroys the formation of the cap. When marsh gas and carbon dioxide are mixed in certain proportions, according to the law of the diffusion of gases, a mixture is formed that is lighter than air, accumulates at the roof and extinguishes a light. This mixture becomes highly explosive by the addition of air. It gives but a momentary cap when the lamp is first raised quickly into the mixture while the combustion chamber of the lamp contains fresh air. The cap as quickly vanishes and the flame dims when the lamp becomes filled with the gas. Owing to this flashing of the cap, the mixture has been termed *flash-damp*.

For pure marsh gas and using an unbonneted Davy lamp burning sperm, lard or cottonseed oil the hights of cap, for different percentages of gas, are given in Fig. 3; or since the hight of the cap varies as the cube of the percentage of gas present, the percentage (J), for any given hight of cap (h) in inches, may be calculated by the formula

$$J = \sqrt[3]{36h}.$$

For example, a cap one-half inch high shows a percentage of

$$J = \sqrt[3]{36 \times 0.5} = 2.62 \text{ per cent.}$$

These values only refer to pure marsh gas and the use of an unbonneted Davy burning a nonvolatile oil. A bonneted lamp gives a slightly less hight of cap, for the same percentage of gas. A volatile oil gives a higher flame cap for the same percentage of gas.

The indications of the cap of a safety-lamp flame may appear easy to understand, but as will be seen from the foregoing, a careful observer will find much to reward his study of those indications.

Mine Timber Frame

The outside length of the collar of a timber frame is 16 feet. The mud-sill measures 19 feet inside of the two legs. Each leg is 6 feet long. The size of all the timbers is 12x12 inches. Find the vertical hight, in the clear, from the top of the mud-sill to the under face of the collar.

Seanor, Penn.

Roughly, the distance between notches, measured on the under face of the collar, is 14 feet. The spread of the legs is $19 - 14 = 5$ feet. Each leg leans inward, therefore, 2.5 feet; and, taking the inclined length of the legs as 6 feet in clear, the corresponding vertical hight, from top of mud-sill to bottom of collar, is $\sqrt{6^2 - 2.5^2} = 5.45$ feet; or, say 5 ft. 5 $\frac{3}{8}$ inches.

TIMBERMAN.

Specific Gravity of Pure Firedamp

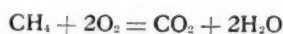
The following question has caused a considerable argument; and we are unable to decide who is right. Kindly answer it in your columns. This request comes from another mine foreman and four firebosses.

MINE FOREMAN.

Reynoldsville, Penn.

Ques.—Give a formula for finding the specific gravity of pure firedamp; and show what is that specific gravity when the firedamp mixture is at its most explosive point.

The chemical equation expressing the reaction that takes place when pure marsh gas is completely burned in oxygen, is



Volumes 1 2 1 2

The equation shows that 1 volume of marsh gas requires 2 volumes of oxygen for its complete combustion. The reaction is the same when marsh gas burns in air; the nitrogen of the air plays no part in the reaction, but simply dilutes the gases and the combustion is not as rapid or intense.

Since oxygen forms 20.9 per cent. of air, the volume of air required for the complete combustion of 1 volume of marsh gas is $\frac{2}{0.209} = 9.569$ volumes. The relative volume and weight of gas and air concerned in this combustion are, then, as follows:

	Relative Volumes	Relative Weights (air = 1)
Marsh gas.....	1	0.559
Air.....	9.569	9.569
Firedamp.....	10.569	10.128

The specific gravity (*sp.gr.*) of the firedamp mixture, at this point, is, therefore, given by the formula,

$$\text{Sp.gr.} = \frac{\text{Weight}}{\text{Volume}} = \frac{10.128}{10.569} = 0.9582.$$

Accurate Firedamp Detector

Please give an account of the Colowe's gas detector.

INQUIRING READER.

The Colowes gas detector used in English mines is considered one of the most accurate means of detecting the constituency of mine gases. This apparatus is based upon the well known property possessed by the pale, hot flame of hydrogen gas, rendering visible small percentages of firedamp. It can be attached to any suitable form of safety lamp, and consists essentially of a gas cylinder containing hydrogen under high-pressure. The size of the flame can be regulated by means of a stop-cock and key, and when the safety lamp is needed for other purposes the gas detector can be easily detached.

Provision is made in the hydrogen safety lamps for bringing the hydrogen flame to a standard hight of 0.4 inch, and a scale located within the lamp is the means by which the hight of the cap is measured. A part of the lamp glass is colored black to form a background for the observation of the gas cap. The following table gives some of the results obtained by the use of the detector:

$\frac{1}{4}$ per cent. gas gives 0.7 in cap	Cap very pale and hazy in outline. Cap more definite in appearance and outline. Cap becomes large and more visible with increase of gas.
$\frac{1}{2}$ per cent. gas gives 0.7 in cap	
1 per cent. gas gives 0.9 in cap	
2 per cent. gas gives 1.2 in cap	
3 per cent. gas gives 2.1 in cap	

With this apparatus as little as 0.19 per cent. of methane can be detected. When used by trained firebosses it gives excellent results, as it furnishes reliable data, in a short space of time. The cylinders when charged contain enough hydrogen to make 200 tests.

What is Blackdamp

There has been much dispute as to the nature of blackdamp. Please define it for me. Is it the same as carbon dioxide? Some of my friends say it contains nitrogen.

FIREBOSS.

In chemical textbooks, says Dr. J. S. Haldane, in a paper presented to the British Institution of Mining Engineers, blackdamp is even today often treated as synonymous with carbon dioxide, and this error has led to much confusion. Blackdamp, as ordinarily met with, is simply nitrogen mixed with from about 5 to 20 per cent. of carbon dioxide. It is the residual gas resulting from various oxidation processes in mines and the surrounding strata. The oxygen is consumed, leaving, of course, nearly four times as much nitrogen, while the amount of carbon dioxide formed depends on the nature of the substance oxidized and on other conditions.

DISCUSSION by READERS

Comment, Criticism and Debate upon Previous Articles, and Suggestions from the Experience of Practical Men

Importance of Geology in Coal Mining

I have read with interest the article by the eminent geologist, I. C. White, under the caption of "Importance of Geology in Coal Mining," which appeared in the first issue of your valuable paper.

A knowledge of geology is, no doubt, an essential to the proper training of the mining engineer; especially should he be familiar with the economic geology of the mineral formations, with due respect to locality, for change of locus frequently presents abnormal conditions.

I note that during the progress of his article, Doctor White mentions a case decided in court during the June session of 1911, making the statement: "Had the eminent engineer who advised the plaintiff in this case been sufficiently trained in geology, he would have saved both litigants much time and expense."

The famous case of Ott vs. Berwind-White Coal Mining Company is, no doubt, referred to in the above quotation.

This case has been mentioned several times of late in the various mining journals, and some of the articles have reflected upon the ability of the engineer, intimating that it was through his advice the plaintiff was led to bring his case into court.

The position as engineer for the plaintiff having been filled by myself, it appears only fair to me, to place before the readers of your paper the facts regarding my action in this case.

In November, 1906, the plaintiff was advised by his engineer that the seam worked in No. 30 mine by the Berwind-White Coal Mining Company was the "B" or Lower Kittanning coalbed, this conclusion having been reached from superficial examination of the geological formations exposed in close proximity to the disputed area.

The plaintiff, not being satisfied with the conclusion, authorized his engineer to prospect the field in question in a more thorough and exhaustive manner. It was then decided to resort to the diamond drill and several holes of varying depth were put down on the farm of the plaintiff, and one hole, No. 10, was started just above the horizon of the Mahoning sandstone and continued through the entire group of the lower productive seams and the underlying Pottsville formation to the Red Shale.

This bore hole was a comprehensive one

and showed the existing conditions in a most admirable manner.

The drilling being completed, expert geologists were called by the plaintiff to inspect the cores carefully as obtained from the several bore holes.

These experts reached the conclusion that the plaintiff's engineer was mistaken in his position and that there were just grounds for the contentions held by the plaintiff. The opinion reached by these geologists formed the basis for this lawsuit, and upon their advice and theirs alone, was this case brought before the court.

After carefully examining the outcrops of coal and rock formations in the vicinity of No. 30 mine, and after making a most thorough surface and underground survey, the engineer for the plaintiff traced the various seams of coal from the undisputed area of mining at Johnstown and prepared from those notes a geological section extending into the field in dispute. As a result of this work the engineer presented to his client a carefully prepared report bearing the date, Oct. 20, 1910, in which he again most emphatically advised the plaintiff that the efforts to disprove the identity of the coal seam being worked at No. 30 mine as any other than the "B" or Lower Kittanning bed were futile and of no avail. This was the final and fixed conclusion of the "engineer in this case."

Had the eminent geologists made a more careful study of the details presented by the engineer, which seemed to be wholly lost sight of in the endeavor to apply conditions existing in other counties to the point in question, this case never would have seen the light of day. "To err is human," and the more expert we become in our chosen vocation, the less liable are we to appreciate this fact.

C. P. COLLINS,
Mining Engineer.

809 Johnstown Trust Building,
Johnstown, Penn.

Fair Play for the Mule

I assume from the cuts accompanying Mr. Conner's article which appeared Nov. 18 last and from his previous affiliations with the Pennsylvania Coal and Coke Company that his comparison of mechanical and mule haulage refers to actual experience at Ehrenfeld, Penn. I would like to say anent that matter that I know the mines from South Fork to Johnstown fairly well. In most cases

where mules are used, I have found wood rails in the rooms and poorly alined steel in the entries. The switches where the room rails lead on to those of the entry are of the stationary type and the driver has to "slew" his car at such places and even despite this assistance, the majority of the loads leave the track. The rails also are so light that the flanges of the car wheels grind on the dirt in the road and thus the tractive force of the mule is opposed by a natural brake resistance of more or less magnitude.

When motors are installed, as Mr. Conner says, all switches are built in railroad style. This gives the motor an unfair assistance in any comparison between motor and mule. Some time ago we extended a motor road a distance of 1500 feet, though we were not ready to use motors on that part of the road for a whole month later. The driver said, "If you made all roads as good as this and laid good switches like these, we could haul more cars too."

If you are given 5 ft. of coal, steel rail, good switches and good alinement, both laterally and in surface and a haulage distance not exceeding 1500 ft., you will find that the mule is a strong competitor of any other haulage unit. Nevertheless I would urge that motor haulage should be advanced frequently so that the mules may never be compelled to haul any further than the distance suggested.

JOSEPH VIRGIN.

Plymouth, W. Va.

Purchase of Explosives

It has been the custom for British miners to purchase their supplies of explosives freely from whatever source they chose—coöperative stores, etc. Notwithstanding the Truck Act, there has been a suspicion that when these were sold by the operators, some at least so arranged that a profit accrued to them on the transaction. For this reason, in many districts the miners adopted the coöperative principle and bought their explosives in large quantities. Recently, public opinion has altered, and it is now agreed that in dealing with such dangerous substances it is essential that every risk of accident should be removed. The new Mines Act will contain a clause requiring that no explosives except those provided by the owner shall be used in any mine. These must be furnished to the miner at net cost.

London, Eng.

F. J. E.

EXAMINATION QUESTIONS and ANSWERS

To Encourage, Assist, and Instruct Those Preparing for Firebosses, Mine Foremen, and Inspectors Examinations, Selected and Original Questions Are Carefully Answered And Fully Explained

Some Iowa Examination Questions

FAN VENTILATION—RELATION OF SPEED OF FAN TO QUANTITY OF AIR DELIVERED

Ques.—A fan running at 80 r.p.m. delivers 100,000 cu.ft. of air per min. in the mine; how much air will this fan deliver under the same conditions when running at 100 r.p.m.?

Ans.—The common rule-of-thumb assumes that the quantity of air circulated in a mine or airway, under constant conditions, by a centrifugal fan varies as the speed of the fan. Or the quantity ratio

$\frac{x}{100,000}$ is equal to the corresponding speed ratio $\frac{100}{80} = \frac{5}{4}$, which gives for the increased quantity

$$x = 100,000 \times \frac{5}{4} = 125,000 \text{ cu.ft. per min.}$$

To be more accurate, however, the fifth power of the quantity ratio is equal to the fourth power of the speed ratio, which gives

$$\left(\frac{x}{100,000}\right)^5 = \left(\frac{5}{4}\right)^4 = \frac{625}{256} = 2.4414$$

$$x = 100,000 \sqrt[5]{2.4414} = 119,500 \text{ cu.ft. per min.}$$

HORSEPOWER OF AIR-CURRENT

Ques.—A water-gage reading of 2 inches is taken on a current of air that measured 50,000 cubic feet per minute. What is the horsepower of the current?

Ans.—First, find the pressure corresponding to 2 inches of water-gage; thus,

$$p = 5.2 \times 2 = 10.4 \text{ lb. per sq.ft.}$$

The horsepower on the air is then

$$H = \frac{qp}{33,000} = \frac{50,000 \times 10.4}{33,000} = 15.75.$$

MEASURING THE VELOCITY OF AIR-CURRENT

Ques.—How is the velocity of an air-current, in a mine, correctly measured with an anemometer?

Ans.—Select a place in the airway where the line of the entry is straight and of uniform grade for a distance before and behind the place chosen for observation, and where the roof and floor lines are unbroken and there is no obstruction to the regular course of the air.

Measure the cross-section of the airway carefully, at this point, and calculate its area in square feet. Now, stand-

ing facing one rib of the airway, first, read the anemometer carefully and note this reading in a book. Holding a watch in one hand, extend the other grasping the instrument firmly, and hold the latter square with the air-current, at arm's length. Observing the seconds hand of the watch, when all is ready touch the spring that throws the recording mechanism or dial hands of the instrument into gear. At the end of one minute, or two minutes if desired, again touch the spring and throw the dial hands out of gear. Now read the instrument a second time. The difference of these two readings, divided by the number of minutes the in-

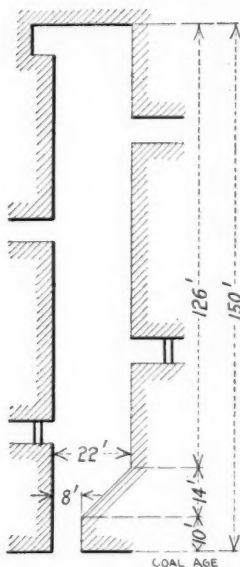


FIG. 1. PLAN OF ROOM

strument was recording, gives the velocity of the air-current.

This reading may or may not be an average reading for the entire section of the airway, according as the person taking the observations has exercised his best care and judgment. A good plan is to take several minute readings in different parts of the section of the airway, and from these determine what should be an average reading for the airway.

In some cases, persons desiring great accuracy, make allowances for the obstruction of the area of the airway by the body of the observer, or stand in a niche cut in the rib of the passage to avoid obstructing the current. The observer should experiment on these methods to ascertain how the most reliable results can be obtained. He should strive

to make all air measurements in the same manner, so that his results will be uniform.

Ques.—What is the law with respect to measuring of air currents?

Ans.—Section 21, of the revised mining laws of Iowa, requires that measurements of the air current shall be taken at the foot of the intake of the mine, and near the mouth of each split; and, also, near the working face of the entries, by an anemometer, which shall be furnished by the owner or lessee of the mine, who shall take such measurements at least once each week, and make a record thereof, showing the time and place of each measurement. A copy of these measurements must be retained at the mine office and a copy sent to the State mine inspector of the district in which the mine is located.

COAL TONNAGE IN A MINE CHAMBER

Ques.—How many tons of coal will a room 150 feet long and 22 feet wide produce in a 4-ft. seam of clean coal?

Ans.—Assume this room is driven narrow, say 8 ft. wide, for a distance of 10 ft.; and then widened out, on an angle of 45 deg., to the full width of the room (22 ft.). The remaining distance, in which the room is driven full width, is $150 - 10 - (22 - 8) = 126$ ft., as shown in Fig. 1 just opposite. The area of the floor of the room, including two break-throughs 8 ft. wide and, say 12 ft. long is then

$$8 \times 10 + 14 \left(\frac{22 + 8}{2} \right) + 22 \times 126 + 2(8 \times 12) = 3254 \text{ sq.ft.}$$

The solid contents of coal excavated in this area, for a 4-ft. seam is $4 \times 3254 = 13,016$ cubic feet.

Taking the specific gravity of the coal in Iowa as 1.28, calling the weight of water 62.5 lb. per cu.ft., the weight of the coal is $62.5 \times 1.28 = 80$ lb. per cu.ft. Allowing for a waste of, say 3 per cent., for coal lost in the gob, the mine-run tonnage for this room would be $13,016 \times 80 \times 0.97 \div 2000 = 505\frac{1}{2}$ tons.

BLACKDAMP IN MINES

Ques.—How is blackdamp detected?

Ans.—The presence of blackdamp in the mine is first made known by the dim burning of lamps, or by their complete extinction when the gas is present in sufficient quantity. Later it produces headache, nausea and pains in the back and limbs of the workmen.

SOCIOLOGICAL DEPARTMENT

A Bureau Devoted to the Welfare of Miners Everywhere, and Especially Designed for the Betterment of Living Conditions In Mining Communities—COAL AGE will be Glad to Print Any Suggestions or Ideas of Value to this Department

First Aid and Its Claims

BY M. J. SHIELDS*
AND J. B. MAHON†

The Department of Health in the mining industry or "First Aid to the Injured Miner," among the officials and workmen of the coalfields has long since passed the experimental stage, and has come to be known as a permanent, well organized and well recognized factor in the progress and life of the great coal industry. Nor is the good work today confined solely within the ranks of men engaged in mining coal. The classes instructed in first-aid principles and practice have imparted their knowledge to friends and fellows employed in other vocations, while the public contests and demonstrations conducted annually for several years past have proved contagious and have enlisted the active interest and support of a large percentage of our philanthropic people who are in no way connected with the coal-mining industry. Viewed from a humanitarian standpoint, it is not too much to say that this movement stands unique and alone as a means of conserving life. It minimizes pain and suffering among the toiling masses who, in their various occupations, are so constantly exposed to, and all too frequently overtaken by, serious accidental injuries, or sudden illnesses from exposure, etc.

DEATH COST OF IGNORANCE

The practice was rife among all classes of workmen a few years ago of moving injured persons in wagons or other conveyances long distances from the scene of the accident to the home, with the fractured bone unprotected, the exhausting hemorrhage unchecked, the burned body uncovered and exposed to cold and dust, the open wound packed with foul and offensive material. The man who was asphyxiated with the deadly "black damp" was left, unconscious to die, with no thought and no effort to restore him to consciousness. All these conditions and many more, equally dangerous, falling within the range of everyday observation, have changed completely. To the ignorant, superstitious, clumsy, foul and filthy attempts to render aid in emergencies there has succeeded, as a result of training and disciplining men, rational, clear and eminently successful methods of ministering to the injured, prepara-

tory to professional treatment, either medical or surgical.

Of course it is admitted that in former times the "spirit was willing," and in most instances the workman whose companion suffered injury would put forth some sort of effort to render him assistance; but as has already been intimated in the great majority of cases his well meant but misdirected efforts usually added "insult to injury," and instead of affording true succor, did absolute harm and increased the mischief by adding a new element of danger through infectious germs, carried by unclean hands unclean dressings and ignorant and meddling interference.

THE NEW ORDER OF SKILLED HELP

Today a new order reigns among a very large proportion of the laity and the number of skilled ministrants is rapidly increasing. The great coal corporations have placed in all their mines miniature hospitals amply supplied with cleansing utensils, antiseptic dressings, bandages, splints, cotton, tourniquets and a few simple restoratives.

The workman has been taught what is meant by "infection," its power for mischief and how best to avoid its inception; and he approaches his unfortunate collaborer suddenly stricken down by the premature blast, the falling rock or the explosion of the treacherous gas, not only willing and anxious, if need be, to risk his own life in his desire to aid his friend, but also with a well defined knowledge of what is best to do, and how best to do the right thing and how to make his efforts most availing. He is no longer groping in darkness and ignorance, performing haphazard any act that may suggest itself; but thoughtfully, systematically and understandingly he proceeds in an intelligent, disciplined manner to take up, step by step, the measures best calculated and best adapted for the rescue from danger and for the restoration to health and strength of the unfortunate victim of an accident.

Has a simple fracture of a bone been sustained; the first-aid man is competent and ready to confine the injured limb with improvised or better apparatus, if that be at hand, thus minimizing pain and suffering and possibly preventing the transforming of a simple to a compound fracture with all its attendant dangers of infection: Is an artery severed and the life current rapidly slipping away; the training of the first-aid man has banished his fear of blood and enables him to ap-

ply pressure through digital compression, compress or tourniquet until medical help is procured.

Has white or black damp from an explosion asphyxiated the employee in the mine; his instructed fellow workman knows just how to carry him most quickly and most easily to a place of safety and can there apply artificial respiration or other restoratives to snatch back a life that has actually been snuffed out, and so a life is saved.

Has the body, the limbs or the face of a man been torn and wounded by flying coal or rock or other missile; his companion cautiously and carefully covers his wounds with antiseptic gauze from the hospital or first-aid packet, places over the scarified flesh a layer of cotton and confines this dressing with an appropriate bandage. Is the workman's body roasted by an explosion of powder or gas; then almost before the smoke has cleared from the chamber and hours before a physician can be summoned, his agonizing wounds are covered with soothing oiled gauze, cotton and bandage, again reducing physical pain and suffering to a minimum and beyond a doubt contributing, as no other agency could, to the comfort and welfare of the suffering individual, and taking the first, and in many instances the most important step in restoring this man to his family, to life and health and strength.

Viewed from every standpoint we believe the work is praiseworthy and deserves the support and indorsement of all right minded people.

MEDICAL PROFESSION NOT ANTAGONIZED

To the surgeon it has proved to be a helper he can trust and one that, in emergency, he can call upon for needed assistance. If one idea has been taught with greater force and more emphasis than another, it is that the first-aid man must not assume the province of the physician, that his efforts end at the point where the work of the physician begins and having been taught the dangers of infection or the risk of neglect of even slight injuries, the victim of an accident almost invariably seeks the advice of a competent medical man rather than run the risk of the possible harmful sequelæ so common in former times. Again, instead of the doubly infected wound caused first by the injury and secondly by manipulation with unclean hands and filthy dressings, the surgeon is placed in charge of a wound

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as nearly aseptic as conditions permit, from which the patient makes a rapid and complete recovery, thus adding not a little to the reputation of the medical man as a skilful and up-to-date surgeon. Nay more, in numerous well authenticated instances, lives have been saved by the prompt and efficient work of first-aid men in applying artificial respiration, arresting hemorrhage, using restoratives, etc. Thus patients have been placed in the hands of the physician, proper subjects for his further professional care and treatment, whereas without first aid the injured person, succumbing to his injuries, might have been turned over to the tender mercies of the undertaker or coroner.

Casting out, then, for the sake of argument if you please, the idea of humanitarianism (and no other class of men, in any walk of life, are more entitled than physicians to be termed humanitarians), the physician, from a purely business standpoint, cannot afford to turn a deaf ear to the uplifting and upbuilding of this work of mercy.

No physician worthy of the name will neglect or refuse to adopt the quickest, the shortest, the safest and the least painful route or pathway that will lead the unfortunate victim of accident from danger to safety, from pain and misery to rest and comfort, from a bed of illness and suffering in the shadow of death, back to life and strength and perfect health. More than this, no true physician, even though it meant to him personal financial loss, would withhold his support from any movement which has for its object the achievement of these ends.

THE VALUE OF THE INDUSTRIAL CORPORATION

We believe and we know that the great corporations which have spent large sums of money in promoting this work have been prompted by an honest and praiseworthy desire to lessen the accidents occurring among their employees with all the attendant pain and suffering and privations which such accidents entail. But even if prompted by no higher or nobler sentiment than mere economy or personal gain, the money expended along these lines will prove a paying investment. All too frequently in all great industries, especially mining and railroading, the lives of prominent and valuable men, as well as those of the most humble laborer, are placed in jeopardy, and daily and hourly without a moment's warning the blow falls, and someone is crushed to earth, a bleeding and helpless mass, requiring instant aid if life is to be saved, or health regained.

If all such accidents would occur at or near the door of some good hospital or near the home of a competent physician, the work of the first-aid men would probably be uncalled for and unnecessary.

But with men at work a mile underground, there could be no second choice on the part of anyone if the alternative were presented of being in the company of men instructed in the principles and art of applying all known temporary measures for relief in emergency, or of being among people untrained, undisciplined and ignorant of any well defined mode of action with which to face the demands of urgent necessity in time of danger or catastrophe.

FIRST AID FOSTERS PROPHYLAXIS

Not only are men taught to render every preliminary assistance possible or necessary in time of distress or danger, but the idea of prophylaxis, that is, avoidance of accidents, has not been overlooked or neglected. At each session of our first-aid classes, a certain portion of time is set aside for the general discussion of "accidents, their causes and prevention." These discussions have proved very interesting, and official reports declare that workmen are daily becoming more cautious and careful in safeguarding not only each man his own life, but the lives and limbs of his co-workers as well.

Thus, it may be demonstrated that there occur fewer falls of dangerous roof or rock, a lessened number of premature blasts and explosions and fewer casualties in general. There result a diminished death rate, fewer lawsuits for damages and, best of all, fewer cripples, widows and orphans to become objects of charity or burdens upon the public treasury. So that it may well be assumed that great corporations, employing large numbers of men, are acting wisely and well, in encouraging and promoting this beneficent work.

Finally, it is an economy for the State which annually appropriates large sums of money for the support of our charitable institutions. Hospital records show conclusively that among injured men receiving immediate first aid there are fewer cases of infection, and hence reduced cost for surgical dressings, and shorter periods of disability. This greatly diminishes the cost of maintenance and, best asset of all, increases and promotes the chances of the patient for an early, permanent and absolute cure.

Many individual cases might be cited where proofs of these claims stand forth too plainly to be questioned or doubted, and the number will multiply just in proportion as the true objects and aims of the first-aid movement become better understood, more thoroughly taught and more generally practised.

That first aid antagonizes no legitimate interest, professional or lay, is now generally acknowledged. Discussion at the present time all trends toward a consideration of the best means for promoting the ends the movement was created to foster.

First Aid Hints

In case of an accident the first requisite on the part of the first aid man is presence of mind. There is nothing more dangerous to an injured person than the noise and excitement of an on-looker; on the other hand, there is nothing more satisfying and soothing to the injured than gentleness and quietness on the part of those helping him. While haste, roughness and excitement are to be avoided, quickness coupled with quietness are to be sought. Readiness and quickness, together with the application of proper treatment, has been the cause of saving many lives.

When applying the finger to the several arteries and blood vessels, to stop bleeding, be sure and cover the tip with gauze. A better method of stopping bleeding is by the use of a compress of gauze held in position by a roller bandage. Arterial bleeding means bright red blood given out in spurts. Bleeding from veins is free and continuous, and dark in color. With large arterial wounds, cover the fingers or thumb well with gauze and press into the wound. If the size of the wound permits, pack thoroughly with gauze well pressed down; then apply a tourniquet above the crushed portion of the limb. Tourniquets can be made from old rope, a pair of suspenders, or a handkerchief.

When there is an unnatural mobility or freedom to move, the bone in the part where it occurs must be fractured. When the skull is fractured, unconsciousness usually results. Fracture at the base of the skull may result in hemorrhages of the ears, eyes, nose and mouth. A watery discharge may escape from the ears.

The extent to which first aid work is occupying the minds of mining men the world over is well illustrated by a demonstration of the utility of the jinrikisha as a life-saving device, recently given by the Singapore Volunteer Corps. The wheels minus the body were equipped with a cross-bar to which was attached two perpendicular wings which fitted into iron slots affixed to the arms of the stretcher. The whole is covered with a water-proof covering.

The necessity of equipping all collieries with one or more well trained first-aid corps cannot be over-estimated when it is remembered that the life of a seriously injured man depends to a large extent upon the first help rendered him after his injury. Economy as well as humanitarian reasons will render such corps as necessary as mine engineers or fire-bosses in the future when labor legislation, with its pensions for widows, and sick benefits for the injured, shall have progressed as far as in some continental countries.

COAL and COKE NEWS

Editorial Correspondence from our own Representatives in Various Important Mining Centers, and a Record of Legislative and Other Action Affecting the Coal Industry

Washington, D. C.

Extensive legislation with respect to coal is expected from the current session of Congress. During the special session a considerable number of bills were introduced. Many of these related to Alaska and doubtless will be superseded by such general measures as the Federal Government may suggest in lieu of them; but there were numerous other measures, relating to a variety of subjects, that will not be disposed of in this way.

Among them are the bills relating to the safeguarding of mining operations in Alaska and the territories, the appropriations for the establishment of mining schools in various regions, the different bills providing for the use of protective devices in connection with mining (these, however, being generally disapproved by the Bureau of Mines, as an undue extension of Federal power), the grist of bills relating to changes in the tariff on coal, several measures providing for the refunding of excess duties collected on importations of coal, and a number of others.

It is probable that several of these bills, which have heretofore been rather unfavorably treated, will be regarded in a somewhat different light, owing to the fact that they are now in the hands of committees of the House whose composition is politically different from what it has been heretofore. Moreover, the personnel of the Senate Committee on Mines and Mining has also changed, so that there is a fair prospect for a different point of view at that end of the capitol as well.

NAVY DEPARTMENT TESTS OF WESTERN COALS

Secretary of the Navy Meyer has announced that he will state in his annual report that repeated tests of coals mined on the Pacific coast have proved them unsuitable for use for steaming purposes by battleships. However, despite the poor showing in the experiments so far conducted, further tests of Western coal will be made. Alaskan coal has been found to possess all the steaming qualities necessary for use on warships, and Mr. Meyer expresses the hope that the coal mines in that territory will soon be developed. At present the Navy Department pays large sums annually to ship owners for the transportation of West Virginia coal to the Pacific coast.

Mr. Meyer will say with reference to Pacific Coast coal: "Actual steaming tests aboard two of the armored cruisers of the same class have been made of six representative coals mined in Washington and three kinds of coal mined in British Columbia. The coals thus tested were the best obtainable and were selected after exhaustive inquiry. The department has directed the formulation of plans for further tests and the work of selecting coals mined in British Columbia, Utah, Wyoming, Colorado and New Mexico is now being prosecuted."

Appropriations asked for by the Navy Department, with reference to the purchase of coal during the fiscal year ending June 30, 1913, are as follows:

COAL AND TRANSPORTATION

Coal and other fuel for steamers' and ships' use, and other equipment purposes, including the expenses of transportation, storage, and handling the same and for the general maintenance of naval coaling depots and coaling plants, water for all purposes on board naval vessels, including the expenses of transportation and storage of the same, \$4,000,000.

DEPOTS FOR COAL

To enable the Secretary of the Navy to execute the provisions of section 1552 of the Revised Statutes, authorizing the Secretary of the Navy to establish at such places as he may deem necessary, suitable depots for coal and other fuel for the supply of steamships of war, \$500,000.

CONTROLLER BAY INVESTIGATION

It has practically been decided to suspend or give up the so called Controller Bay investigation, which was directed last season by the House of Representatives, through a special committee, under the chairmanship of Representative Graham. The outcome, while not distinctly confessed, is practically admitted in a statement by Mr. Graham, foreshadowing the contents of the report, in which he says that the inquiry has been well worth while, because it has resulted in calling attention to the subject and in enforcing upon the Administration the necessity for a different kind of action from that which was contemplated.

The practical termination of the inquiry does not mean that nothing is to be done, but merely that the technical phases of the coal-land investigation

will now go to the joint public-lands committees of the House, which will be expected to receive the testimony of Secretary Fisher and of Director Holmes, of the Bureau of Mines. Mr. Holmes and the Secretary both visited Alaska during the past summer, and there made a careful and thorough investigation of the coal-land question, the results being embodied in Mr. Fisher's address before the American Mining Congress at Chicago. Mr. Fisher is evidently determined that the pressure for legislation shall not be given up and that there shall be a distinct result to his own efforts and those of the Government generally.

It is probable that bills will shortly be introduced embodying the ideas which he has suggested to President Taft with reference to the regulation, not only of Alaskan lands but also of the public lands of the United States generally. The prospects of enacting these bills will depend largely, if not wholly, upon the activity of President Taft in urging their enactment. There is a small but compact opposition in Congress to the adoption of any measures that will safeguard the public lands in an adequate manner.

Alabama

Birmingham—The Empire Coal Company was recently awarded a contract to furnish approximately 300,000 tons of coal to the New Orleans Street Railway and Lighting Company. The Bryan Coal Corporation and the Alabama Consolidated will help to fill the order.

Gadsden—At the meeting of the creditors of the Fort Payne Fuel and Iron Company, the fact was brought out that the liabilities of the company are about \$115,000 while the assets are unknown. The company is capitalized at \$1,000,000 and has large iron-ore and mineral-land holdings at Fort Payne. W. W. Dobbs, of Fort Payne, was appointed receiver.

California

Sutter Creek—The old Buena Vista coal mine was reopened recently under the supervision of W. R. Downs, of Sutter Creek, who owns the property. Downs states that the bed of coal in his mine, which has a shaft 50 ft. deep, is over 12 ft. in thickness and indications are found all over that section of the valley, which tend to show that the supply is considerable.

Colorado

Denver—Shaft No. 2 of the Leyden coal mines at Leyden has been reopened. This is the shaft which caught fire last December, resulting in the death of 10 men from the poisonous fumes, which drove them back into the inner workings of the mine and suffocated them. The shaft, as now built, is fireproof, being lined with concrete, and a similar disaster is impossible.

A third shaft, known as shaft No. 3, is being sunk at a point one-half mile from the mouth of No. 2. With 275 ft. of sinking yet to be done, it is believed that the new shaft will be ready for use in February, thus adding materially to the facilities of the company.

With the three shafts in operation it is the intention of the Leyden Coal company to increase its daily output from 1000 to 2000 tons.

Louisville—Something akin to a reign of terror prevails here. The war between the nonunion and union miners of the Northern coalfield has broken out again, and on Nov. 28 a nonunion mine worker at the Industrial mine, of the Rocky Mountain Fuel Company, was shot and killed. Feeling ran high and next morning 100 union men marched across the prairie from Louisville, armed with shot-guns, rifles and revolvers. The nonunion men quickly organized a similar force at the Superior mine, and an automobile loaded with rifles was sent from Denver. Both sides were looking at one another along the barrels of firearms when Sheriff Capp and a number of prominent business men, of Boulder, arrived on the scene, and after two hours of earnest talk, persuaded the two forces to disperse and return to their respective homes.

E. E. Shumway, president of the Rocky Mountain Fuel Company, fears there will be more trouble and if there is, the company will ask for the protection of Federal troops. The main trouble is that many of the peace officers of the county are derelict in their duty in at once putting down disorder, and it is not at all certain, judging from their actions, that they are not in direct sympathy with the strikers.

Illinois

Taylorville—The miners employed at the Christian County Coal Company's shaft, in this city, have resumed work, the strike having been settled. The strike grew out of the alleged use of nonstandard powder in the mine, and the agreement provides that the miners shall have the remainder of the powder at present in use at one-half the former price and that standard powder is to be used hereafter.

The sinking of a new Peabody mine near Taylorville was started, Nov. 23. The new operation will be thoroughly

modern in every particular and will be located along the line of the Chicago & Illinois Midland Railway. It is expected that about 600 men will be employed.

Rock Island—The Hazel W. Coal Mining Company, of Rock Island, with a capital stock of \$30,000, was recently incorporated. The mine is located a mile south of Mathersville, on the Rock Island & Southern.

The recent speech of E. H. Gary, of the Steel Trust, regarding the Southern Illinois coalfield has already made itself felt in the price of coal leases, and has buoyed the hopes of the southern Illinois operators.

Peoria—The chances are good for an early adjustment of the difficulties which have tied up the Champion mine for some time. The question of shot-firers being employed by the operator has been referred to the State officials.

Marissa—The White Oak mine, which has been closed down on account of a fire in one of the entries several weeks ago, has resumed operations. The fire was walled in and will gradually die out, it is expected.

Indiana

Terre Haute—The Government mine-rescue car will remain in Terre Haute indefinitely, and it is hoped that every mine in the district will organize a crew for first-aid work. It is also planned that the car will visit Clinton, Jasonville, Shelburn and other towns in the Indiana district.

The Rowland Coal Mining Company, of Danville, Ill., has purchased 230 acres of coal land adjoining Patricksburg, a small town on the Monon railroad, in Owen county. Officials of the purchasing company announce that the work of developing the property will be begun at once.

The Indiana Coal and Clay Mining Company has been formed with headquarters in Green Castle. The company is capitalized at \$50,000, and is developing about 80 acres of coal land near Patricksburg. About 100 tons per day are being shipped at present.

Iowa

Boone—The Ogden Consolidated Coal Company's mine No. 2, located two miles south of Ogden, which has been closed for some time owing to labor trouble, is to be opened. New boilers are being installed and other improvements being made preparatory to working the mine to its full capacity.

Oskaloosa—The Regal Coal Company has been incorporated with \$12,000 capital stock, to mine, sell and ship coal, etc.

It is reported that while sinking a well one mile northwest of Kellogg a seam of coal was found at a depth of 140 feet.

Kentucky

Middlesboro—The Louisville & Nashville Railroad has decided to extend its Wasioto & Black Mountain branch on up Clover fork to Fugate creek, 30 miles from Harlan, Ky. This will penetrate the richest and most accessible coal field in Harlan county, running up the valley that divides the Big Black and the Little Black mountains, which are underlaid with some of the thickest coal seams there are in eastern Kentucky. This brings the terminus of the Wasioto & Black Mountain road within a few miles of Appalachia, Va., and it is thought that in a short time the Louisville & Nashville will make this connection with its main line running to Norton, Va., so it will have an outlet both ways for the heavy coal and coke traffic that will soon be developed.

Louisville—One of the largest coal-land and mining deals ever made in the southeastern Kentucky field, was consummated recently when the Southern Mining Company, with main offices at Williamsburg, leased the mining operations of the Asher Coal Company, at Wasioto. This transaction involves the transfer of four operations and a solid boundary of more than 16,000 acres of high-grade coal lands, mainly in Bell county, Kentucky, on the Cumberland river. There are transportation facilities over the Wasioto & Black Mountain railroad.

At present, one large mine is in operation on the property and three others are in process of equipment. It is understood that approximately \$500,000 will be invested in the equipment of these mines, which are to be among the most modern in the South. It is expected that the annual tonnage from these operations will reach the million mark.

The Sears Lumber, Coal and Development Company, of Jackson, Ky., has been incorporated with a capital stock of \$100,000.

Kansas

Coffeyville—The Coffeyville Coal and Coke Company is being organized to develop the coal beds believed to lie four miles southwest of here.

Coal was found at a depth of less than 500 ft., and the vein is said to be 10 ft. in thickness. All the prospecting so far has been done with a drill, but a shaft will be sunk as soon as the company is organized.

Smith Center—At Reamsville, this county, a seven-foot vein of coal at a depth of 22 ft. is said to have been discovered. A sample of the coal was tried in a stove and was found to be of excellent quality, burning as freely as any coal to be found on the market. A similar find was made a mile east of here.

Missouri

St. Louis—The Bessemer Coal and Mining Company, of St. Louis, which owns and operates six large mines on the Illinois Central Railroad, from Pinckneyville, Perry county, to Lenzburg, St. Clair county, has been reorganized. A new organization is to take charge of and operate the three mines in St. Clair county, also the Advance mine at Lenzburg and the White Oak and the T. W. Meek mines at Marissa. The Crystal and Tilden mines, at Tilden, and the White Walnut mine, at Pinckneyville, will be operated by the Bessemer Company, with William Stevenson, of Tilden, in charge. It is reported that 3000 men will be given steady employment.

Nevada

Goldfield—On the property of the Nevada Coal Company situated near Coal-dale, on the Tonopah & Goldfield railroad and west of Tonopah, development work within the past few days has exposed 11 ft. of what appears to be a good grade of coal, with sand rock top. The work is now at a depth of 100 ft. and some water is coming in. Above this depth the coal is a lignite of doubtful grade and dry, but the presence of water affords ground for the hope that at water level and below it will prove to be of better quality. Work on the property is now in progress and the ground will be explored in a most thorough manner. The cheapest coal to be had throughout southern Nevada costs \$15 per ton, and there is a ready market close at hand for the product of a large coal mine. It is said that the prospects are excellent for opening such a mine on this property.

Ohio

Columbus—Eastern Ohio coal operators finally have consented to go into a conference with their employees on the subject of the friction dump, which seems to have been the cause of no little contention at several places throughout the district. At the special convention of the miners, held in October, it was decided to take steps toward having the dumps replaced, and an effort was made to get the operators into a conference. The effort, however, was unsuccessful up to a day or two ago, when the necessary consent was obtained, and a meeting held in Wheeling, W. Va., on Dec. 4.

The Hocking Valley Coal Operators' Association met at Columbus last week to discuss matters regarding the renewal of negotiations for a wage scale with the miners after Apr. 1. There is a movement on foot by President White, of the United Mine Workers, to have renewed the joint-conference agreement which was dissolved in 1908. The four competitive

districts included in the conference were western Pennsylvania, Ohio, Indiana and Illinois. The miners' officials seek to have Oklahoma, Missouri, Arkansas and Kansas also included in the conference agreement. An invitation has been extended to all associations to have delegates attend a meeting called for Chicago, Dec. 15.

Oklahoma

Chickasha—Three hundred members of the Chickasaw tribe of Indians convened in this city recently to discuss the needs of the tribe and recommend legislation to the coming session of Congress. The resolutions committee unanimously recommended that the surface of the segregated coal and asphalt lands be sold at public auction to the highest bidder, no restrictions being placed on the number of tracts a company or individual should buy.

Pennsylvania

BITUMINOUS

West Newton—The West Newton shaft of the Pittsburgh Coal Company, employing 300 men, closed down Nov. 28. The Sarah mine of the same company has also gone out of commission, being worked out, it is reported. The Waverly mine, at Smithton, has been closed down.

Charleroi—The coal mines of the River Coal Company, located at Gallatin and Manown, across the river from Monongahela, were closed Nov. 27. The Gallatin mine employs 150 men and is shut down on account of shortage in Lake trade, while the Manown, which employs 300 miners, was closed on account of shortage in orders to be filled by railroad.

Leachburg—S. A. Rinn, president of the Summit Coal Mining Company, which has its headquarters in Punxsutawney, has purchased for that company about 700 acres of coal land in the vicinity of Dayton, at which place the company already operates a large mine. The property, known as the "Erie holdings," will be developed immediately and it is expected that the first coal will be shipped in about three months.

A little over a mile of railroad will have to be constructed from the mine to the Buffalo, Rochester & Pittsburg line and the contract for this has already been awarded.

Johnstown—The Smokeless Coal Company, which has extensive holdings in Ferndale and vicinity, has completed its new slope. The company, some time ago, took over the workings of the Ferndale Coal Company, which had a slope into the E. seam. The Baltimore & Ohio Railroad Company is engaged in laying a siding to the new tippie, and the company expects to begin shipment of coal in the near future.

Pittsburg—The Clark Coal and Brick Company has been incorporated to engage in mining coal and marketing mineral products. The capital stock is \$250,000.

Articles of incorporation have been filed for the Anterior Coal and Coke Company, of Pittsburg, to acquire, lease, own and operate coal and mineral lands and timber lands, manufacture coke, etc. The capital stock is \$1,000,000.

The Allegheny River Mining Company, which is opening coal mines in Armstrong county at Tidal and Oakland, announces that the two new plants will be ready for operation the first week in December.

A charter has been issued at Harrisburg to the Boynton Coal Company, capital, \$5000, a small concern operating at Salisbury.

ANTHRACITE

Wilkes Barre—The new tunnel which extends 1000 ft. into the Sugar Notch mountain, back of the Delaware, Lackawanna & Western company's Truesdale colliery at Nanticoke, has been put in operation. The tunnel, which is 7x12 ft. taps four veins of coal; this coal is taken to the Truesdale breaker for preparation.

Over 100 men are fighting the fire in the old mine workings under the Lackawanna avenue bridge in Scranton. It is planned to reopen and enlarge the old shaft and to fight the fire from the inside. The operation will permit of the mining of many tons of coal, which may go far in paying the cost of fighting the fire. The Jersey Central railroad company is to build a new station to replace the structure destroyed by fire a year ago. It is purposed to build concrete piers in the surface vein to strengthen the foundations of the structure.

Pottsville—The Philadelphia & Reading Coal and Iron Company has a force of men at work opening a vast bed of coal back of Edgewood Park, near Shamokin. The work of sinking a slope has been started and a railroad has been constructed to the scene of operations. The coal will be mined and hauled to the Bear Valley breaker, where it will be prepared for market.

Washington

Spokane—Lewis Stockett, president of the Western Coal Operators' Association, and general manager of the Canadian Pacific Railroad Company's mines, at Bankhead and Hosmer, Canada, recently stated here that within two weeks the mines will be producing as much coal as ever. The properties are being put into shape and the usual crews are at work.

The Castle Rock Light and Power Company has been incorporated with main offices in Tacoma and will shortly expend \$25,000 on coal-mine development in Cowlitz county.

West Virginia

Fairmont—The directors of the Consolidation Coal Company, incorporated under the laws of the State of Maryland, have filed notice of an increase in capital stock from \$20,000,000 to \$25,000,000.

Charleston—One of the recently incorporated coal companies in this region is the York Coal and Coke Company, of Ashland, Ky., which has been organized to mine coal and manufacture coke in Pike County, Ky., and also in West Virginia and Virginia. The authorized capital of the company is \$50,000.

The peonage case against the Glen Alum Coal Company, of Mingo county, were tried before a jury in the Federal court some days ago. It took the jury but a few minutes to reach a verdict of acquittal.

Wyoming

Evanston—Valuable coal lands in the Evanston district, aggregating 2760 acres, are involved in a decree canceling patents issued on 34 soldiers' additional entries, it was announced lately by the commissioner of the General Land Office.

The decree comes from the Circuit Court of Appeals, which reverses a decision of the District Court, and holds that the lands had been fraudulently acquired for the use and benefit of the Diamond Coal and Coke Company. The coal recoverable on the land is estimated on a royalty of a cent per ton and is worth \$300,000.

Canada

Alberta—H. N. Galer, general manager of the Royal Collieries, Limited, of Lethbridge, Alberta, recently gave out this statement:

"Every coal mine in the Crow's Nest Pass and Lethbridge districts is either now in full operation or is bringing its crew up to full strength as rapidly as the workings can be made ready for the men. More men reported for work on Nov. 27 than the mines were able to take care of at once. Our own mine is employing a full crew and already has attained its normal output."

R. W. Ridell, general manager of the International Coal and Coke Company, of Coleman, Alberta, announced, Nov. 28, that his company is operating with a full crew and shipping 1000 tons a day, which is about half the normal output.

Montreal—It is understood that plans will be immediately put in force toward the long delayed amalgamation of the western coal properties owned by the Lovett-McConnell interests. The Western Coal and Coke Company, the Lethbridge Collieries and the Pacific Pass Coal Company are the companies to be embodied in one consolidation.

PERSONALS

Frank C. Greene, of Cleveland, Ohio, is now general manager for the Graham Island Coal and Timber Syndicate, Ltd., which is prospecting its coal lands, situated on Graham island, of the Queen Charlotte group, British Columbia.

Roy Wilhoit, president of the Wilhoit Coal Company, operating in Bell county, Kentucky, will retire, Jan. 1, from the position of legal adviser to the Kentucky State Railroad Commission and devote his entire time to his mining interests.

Thomas Mitchell, formerly general manager of the W. J. Rainey interests, who retired recently after over 30 years' service, is considering an installation of 250 coke ovens at his mines in the Marrowbone valley, Pike county, Kentucky.

John K. Kerr, for a number of years a jobber in the bituminous-coal trade, has filed a voluntary petition in bankruptcy. Mr. Kerr expects to remain in the coal business as Buffalo representative for the People's Coal Company, of Pittsburg, Pennsylvania.

James Ashworth, of Vancouver, B. C., recently examined the coal property of the Head Syndicate, Ltd., of London, situated in the vicinity of the south fork of the Old Man river, southwestern Alberta. He was accompanied by Leslie Hill, of Nelson, B. C., the company's manager and engineer.

P. C. Kittle has resigned as manager of the Castle Valley Coal Company, Castle Valley, Utah, and has organized the Western Pacific Fuel Company with offices and yards in San Francisco. The company has secured the agency for "King Coal" for California and Nevada.

OBITUARY

Coplin James, treasurer of the F. P. Weaver Coal Company, died at his home in Hamilton, Ontario, Nov. 15.

Franklin O. Wyatt died, Nov. 23, at his residence in Chicago, Ill. Mr. Wyatt was in his seventy-fourth year and had been for 30 years general manager of the La Salle County Carbon Coal Company.

Joseph B. Conrad, for many years the Buffalo representative of Cox Brothers & Co., died recently at his home in Buffalo, N. Y. Mr. Conrad was 71 years old and had retired from active work several years ago.

Thomas B. Davis, brother of ex-Senator Henry G. Davis, died, Nov. 26, at his home in Keyser, W. Va. He was born in Howard county, Maryland, 83 years ago. Colonel Davis, his brother Henry G., the late Stephen B. Elkins and R. C. Kerens were pioneers in developing West Virginia coal and timber lands. Colonel Davis was also interested in other industries and in banking; he is reported to have been worth several million dollars.

Publications Received

Report of the Mine Inspector for the Territory of New Mexico, for the year ending June 30, 1910.

Proceedings of the Kentucky Mining Institute, 1911, dealing with the organization meeting in Lexington, Kentucky, May 29, 1911.

Mineral Resources of Alaska; section H, report of progress of investigations in the Bonfield region, 1910. By S. R. Capps. Bulletin, 480-H, U. S. Geological Survey.

Report of the Department of Mines of Pennsylvania; Parts 1 and 2, covering the anthracite and bituminous fields respectively. James E. Roderick, chief of the Department of Mines.

Trade Publications

The Goulds Mfg. Co., Seneca Falls, N. Y. Bulletin No. 101. Triplex Plunger Pumps. Illustrated, 12 pp., 8x10 in.

Bulletin No. 103. Vertical Single-Acting Triplex Plunger Pumps. Illustrated, 20 pp., 8x10 inches.

The Vulcan Iron Works, Wilkes Barre, Penn. Electric Hoists. Illustrated, 32 pp., 6x10 in. This pamphlet contains lists of sizes, capacities and over-all dimensions of Vulcan hoists, also several useful diagrams for hoisting calculations.

Geared Engines. Illustrated, 32 pp., 6x10 inches.

Industrial Notes

At the winter meeting of the West Virginia Coal Mining Institute, held this past week at Fairmont, W. Va., the Hyatt Roller Bearing Company introduced a small but effective exhibit of roller bearings as applied to mine-car wheels.

Two full-sized bearings were shown; one of these was new; the other had been in operation for one year on a car which had traveled 5000 miles during that time, under average load conditions. It was difficult to distinguish one from the other. A model showing the application of a roller bearing to a capless wheel was also displayed.

The Illinois Valley Coal Company, of Sparland, Ill., has spent the last few months in developing a large mine near Sparland in addition to the one it is already operating, and has just closed a contract with the Ottumwa Box Car Loader Company, of Ottumwa, Ia., for the steel tippie, shaker screen, crossover dump, and other equipment that will be required for an up-to-date plant. The plant will be prepared to load three sizes of coal in addition to run-of-mine, and is being so designed that later it will be possible to install a rescreening plant adjacent to it. This installation is expected to be one of the most modern in the State.

COAL TRADE REVIEWS

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The car shortage, so acutely evident last week, has undergone a perceptible improvement. This cannot be attributed, at this early date, to the additional supply released by the completion of the lake shipments, but is more probably due to a noticeable curtailment in demand.

Shipping ports on the Atlantic coast continue to report supplies short and arrivals slow, with water freights high and difficult to obtain. A small general advance in price is now effective at most of these points.

In the Pittsburg and adjoining districts mines are working 75 per cent. capacity with trade generally steady. Coke is becoming fairly active and the demand for anthracite continues heavy.

A few final lake shipments are being made from Ohio ports on extension insurance, but the trade generally is busy readjusting itself. The customary Christmas suspension of the mines is being anticipated at some points by heavy storing.

At Middle West distributing points heavy tonnages are being handled, due principally to a plentiful car supply. With the exception of that contracted during the summer, this coal is bringing a good figure. Supplies appear good in the Rocky Mountain states and no famine is anticipated this winter.

New York

While spot demand is not so good as last week, contract movement continues heavy and the market here is gradually strengthening. Coal is not being shipped to New York tidewater so heavily as a few weeks ago, the line of business demanding heavier deliveries. The movement to the piers is also slower and there is but little free coal here.

The situation on marine transportation has not improved during the week and boats of all kinds are scarce. Those engaged in the Sound trade have been particularly affected by the unfavorable weather conditions, and when they are again able to move with normal regularity, the demand for coal here will be increased.

Prices at which steam coals are quoted, f.o.b. New York, range about as follows: \$2.35 f.o.b. for West Virginias; \$2.45@ \$2.55 for ordinary Pennsylvania coals; \$2.55@2.65 for fair grades of Pennsylvania; and \$2.70@2.80 for high-grade Pennsylvanias.

Boston, Mass.

There is an appearance of anxiety this week in both anthracite and bituminous. Water freights are strong at \$1.20, Hampton Roads to Boston, on vessels large and small, and rates to other ports are in proportion. Transportation is scarce, and the movement coastwise continues to be slow. Some high prices alongside are quoted, and the large consumer who finds himself in pressing need of supplies is obliged to bid well up to \$4 for cargoes, and then not get the grade he would like. Mystic Wharf prices, on cars, Boston, are up to \$4.10 for spot coal, and then only in small quantities. Tonnage apparently is not catching up and the shortage is likely to become more serious.

On Pocahontas and New River at the loading ports, coal is reported to be coming down in rather less volume. It is engaged well ahead and there is little free for any spot market. Prices are still firm at \$2.60 f.o.b. With the customary Christmas suspension in mining just ahead it is hard to see how the supply of these popular fuels can be much in excess of actual contract requirements. Several of the shippers are rumored to be buying from the smaller operations in order to clear transportation.

Effective Dec. 1, the hatch-load rate on bituminous in Reading barges advanced from 75c. to \$1, Philadelphia to Boston, but this will probably have little effect on the local market. This is an additional reminder that freights are high.

Prices on Pennsylvania coals are firmer all along the line. Points near tidewater are calling for quite a tonnage all rail and this extra demand is likely to be a feature of the winter months. There is also a rather unusual tendency to arrange for February and March deliveries, which shows the anxiety felt in many quarters.

Buffalo, N. Y.

Business is better, operators and dealers generally agreeing their output is at least all that could be desired. Some of the mines worked Thanksgiving day, which is evidence of a heavy demand.

There is also a decided stir in iron. Buffalo furnace managers say that the demand is much better than it was. There is a slight improvement in coke, and the advance in the price of steel has added to the general confidence. The

better condition of the coal and allied trades is not large and may go no further, but it means much to the general business, especially if the improvement lasts.

Complaints of the slow movement continue. The consumers will do well not to let their stocks run low, or there will be a shortage in the future, especially when cars are held up by bad weather in winter. The weather is now mild, but it has not reduced the demand for soft coal.

Prices, especially in slack, are somewhat stronger, being based on \$2.50 for Pittsburg three-quarters, \$2.40 for mine-run and \$2 for slack. Coke is a trifle less dull at \$4.25 for Connellsville foundry and \$3.50 for stock. Practically all mines are running full capacity, and there is less cutting of prices, so it is safe to say that the trade is now on a profitable basis.

In the anthracite the demand for chestnut is such that some dealers are unable to meet it and those more favorably situated are far behind their orders. Buffalo has handled considerably more anthracite this year than ever before, either locally or in reshipment by lake or rail.

Pittsburg

Bituminous—Manufacturing and domestic demand is fairly good, and mines are running at an average of not far from 75 per cent. of full capacity, with prices quite steady. There are occasional complaints of car shortage, and the movement is rather slow.

Operators believe they now have a fairly accurate line on the scale demands for next year, the settlement being unusually important, as both the two-year bituminous and the four-year anthracite scales come up. The probable demands will be a 20 per cent. advance over the present scale by the miners, and a 15 per cent. reduction by the operators and a settlement is expected on the present basis, after a suspension of between four and six weeks.

Market prices are held somewhat more stiffly, but the minimum of the open market can still be fairly quoted at figures given last week: Nut, \$1@1.05; mine-run, \$1.05@1.10; ¾-in., \$1.15@1.20; 1¼-in., \$1.25@1.30. Slack has advanced, owing to the close of the lake shipping season, and is quoted at 55@60c.; all prices per ton at mine, Pittsburg district.

Connellsville Coke—Additional details

are available regarding the contracts for next year's furnace coke reported a week ago as having been closed. Six additional contracts can now be reported, one for 10,000 tons a month over the first half, at \$1.60, and the following for the full year: 12,000 a month at \$1.65, 8000 a month at \$1.70 and 7000 a month at \$1.75, with two contracts for 9000 and 12,000 a month on a ratio basis, a given fraction of the average price of pig iron in the Valleys. The tonnage mentioned here are only approximate, as the contracts are generally requirement contracts, depending upon the operation of the furnaces.

With the 35,000 tons a month taken by the Youngstown Sheet and Tube Company at \$1.65, noted last week, a total of over a million tons of coke for next year has been closed, involving nearly 100,000 tons a month during the first half and somewhat less during the second half. This is about one-sixth the merchant production at the present rate of output, this being at the rate of about 600,000 tons a month by the merchant ovens and about 800,000 tons a month by the furnace ovens.

Additional contracts are under negotiation, the contracting period opening a trifle more briskly than a year ago, although the level of prices is substantially the same. The most striking difference is that fewer contracts are being made on a ratio basis, flat prices being preferred. This arises from the fact that there are no prospects of material fluctuation in prices of coke or pig iron at this time. Operators have in the past year or two insisted upon a fairly stiff minimum for coke, when making ratio contracts, and this minimum is generally so close to the flat price at which coke could be bought that furnaces prefer to buy at that.

Sales of 50 or 60 cars of prompt furnace coke have been made in the week at \$1.50 and of 40 or 50 cars at \$1.55. While most foundry-coke contracts are made to run for the twelvemonth beginning July 1, a few have lately been closed, beginning Jan. 1, to run for six months. We note two such at \$2.25, one at \$2.15 and one at \$2.10, these covering particularly good grades, while there is some coke available on contract at \$2. Sales and contracts made in the past fortnight are precisely in line with quotations made in these reports for several weeks past, and we repeat last week's quotations: Prompt furnace, \$1.50@1.55; contract furnace, first half, \$1.60@1.65; second half, \$1.65@1.80; prompt furnace, \$1.80@1.90; contact foundry, \$2@2.25.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending Nov. 25 at 330,793 tons, a gain of 14,000 tons, and shipments at 3740 cars to Pittsburg, 4950 cars

to points west and 931 cars to points east, a total of 9621 cars, a gain of 200 cars.

Baltimore, Md.

Numerous inquiries during the past week had the tendency to arouse the hopes of a still further improvement in market conditions here. There were more queries for prices than for some weeks past, and operators believe that many of them will develop into actual business.

Even with the railroads as customers, market prices have not been affected, and the demand has not been active enough to disturb the present price level. Consumers who entered the market got the product for about the same they paid a month ago or longer. The lower grades of coal are still awaiting purchasers at prices ranging from 50c.@ \$1 per ton, while the better grades are quoted at from \$1.30@1.60 per ton.

The big industries have not entered the market for large quantities of the product for some time. The large orders for cars and steel rails, it is thought, will greatly improve the coal-trade situation within the next few weeks.

Philadelphia, Penn.

The demand here is increasing as the winter progresses, and the dealers are at their wits' end to get a supply of certain sizes. Egg coal is not moving off as promptly as stove and chestnut, but there is considerable demand at that. A surprise was sprung upon the public the day before the first of December, announcing an advance of 25c. in the prices of the domestic coals. This created quite a sensation and much was made of it by the newspapers, and the legal representative of the city threatened to investigate the alleged "recommended prices" that were made, to see if there had been any violation of the law regarding restraint of trade. It has simmered down, however, and while a number of the dealers are asking the increased prices, it is understood that very few, if any, are turning down orders at the old figures. Stove is in much demand now.

Some of the individual operators in the city have advanced the prices of their stove and pea coal, 25c. per ton, to meet the existing conditions. It is understood, however, that the large companies are not disposed to make this advance, but are standing on their circular prices issued in September. The demand still continues far in excess of the supply, although there is a falling off in egg. Line as well as tidewater business is in excess of last year so far this month, and the tonnage for November was almost a record.

The bituminous business seems to be picking up all around, although this is reported to be additional movement on long-term contracts.

Cleveland, Ohio

Domestic business continues brisk. The weather is still cold and the demand, in consequence, is increasing every day. No change in prices has taken effect on these commodities since last week.

The steam trade does not show any great improvement as to demand or prices except in slack. Slack coal of all grades has taken a wonderful jump in the past week, and has increased all the way from 15 to 20c. per ton. There does not seem to be any scarcity of this, and the demand for domestic being so good, slack is plentiful.

Lake Trade—Insurance extensions have been granted on eleven bulk freighters at an additional rate of 1 per cent., and nearly as many more will sail without insurance during the next few days. Most of the boats that have been lined up for coal cargoes will leave before midnight, Sunday, which is the time limit for loading, but a few of them will sail later. All of the freighters will not be in at the layup ports by the end of next week. Coal shippers are still in the market for tonnage and a number of charters for Lake Michigan ports were made yesterday at 75c. from Ohio ports and \$1 from Buffalo.

Columbus, Ohio

Higher temperatures and the closing of the lake season have given a quiet tone to the Ohio market. The general effect was to reorganize the trade and prices did not suffer in the least. There is still somewhat of a car shortage but not sufficient to cause any great inconvenience to shippers and dealers. Prices have ruled rather firmly during the past week, despite the unfavorable weather conditions. On the whole the trade has been satisfactory and coal men generally believe that better things are coming.

Stocks in the hands of dealers are not large and their orders to the operator and wholesaler have been for immediate delivery. There is a large supply of cars now and most of the operators are well up on their orders.

Operations in the various Ohio fields during the past week have been active despite the warmer weather. In the strictly domestic fields a large tonnage was produced and in the Hocking valley the output was about 75 per cent. of capacity. The same is true of the output in the Pomeroy Bend district. In eastern Ohio the output was not quite so large but the tonnage was good and satisfactory to most of the operators. More strength is shown in the fine-coal market.

The steam trade shows signs of improvement. Some of the railroads are taking a large tonnage because of a better freight movement and there is also

some disposition to store in anticipation of a suspension by April 1.

Prices in Ohio fields are:

Eastern Ohio:

Fancy grades domestic lump....	\$1.75@2.25
Mine-run.....	0.95@1.05
Coarse slack.....	0.35@0.40
Nut, pea and slack.....	0.40@0.50

Pomeroy Bend:

Domestic lump.....	\$1.60@1.75
4-in.....	1.35
Nut.....	1.15

Hocking Valley:

Domestic lump.....	\$1.50
Mine-run.....	\$1.05@1.15

Cincinnati, Ohio

The demand for all kinds of coal is keeping up and some are improving every day. The weak branch is fine coal, the poorer grades of which are still heavy on the market and there is considerable on track looking anxiously for buyers. The better grades, however, are bringing the same price as previously.

The weather continues seasonable and there seems to be no lack of orders for domestic lump. The steam demand is good and gradually increasing. It is believed that there is considerable stocking of steam fuel by the large consumers, because it is not thought that many of the miners will be on the job and ready for work between Dec. 23, which is payday and New Years.

Those operators and wholesalers, who have thought at all about the outlook for the new year, declare that there can be nothing but good prospects for the coal business. They say that there should be increased activity in all industrial lines, and that the almost certainty of a suspension, more or less general in extent, and of indefinite duration will aid in adding tone to the market.

Louisville, Ky.

A lively war is on in local retail coal circles and the dealers are rushing into print, with prices quoted, as never before. The E. T. Slider Coal Company is said to be the instigator. This company is a comparatively new one here, having only recently completed an elevator for the handling of coal and river sand.

Kanawha river and Pittsburg coal are being quoted at \$3.50 per ton of 2000 lb., while another concern is making an offer of Pittsburg lump at \$3.25, for 25 bushels. Tidewater lump is being advertised at \$3.25, and nut at \$3, per ton of 2000 lb., in addition to which premiums are given. Wilton-Jellico continues to sell at \$3.60 per ton.

There is plenty of river coal in the market and this accounts for the prevailing low prices, despite the early winter weather. Pittsburg is selling, wholesale, at 8 and 8½c. a bushel. The river stages so far this winter have been favorable to the shipment of coal from the East.

Nashville, Tenn.

Business in the west Kentucky field is not as satisfactory as the operators would like to have it. The dealers seem to be buying from hand to mouth. Each cold spell produces some little demand, but when the weather turns warm it becomes quiet again.

There has been a concentrated effort on the part of the operators in this field to establish a price on lump coal, from Dec. 1, of \$1.50 per ton. There is no reason why they should not obtain that much during the winter months, but there is so much coal produced in this field, with such a limited territory for it to be shipped into, that it will be difficult to maintain this price, unless we have severe weather conditions.

There is little improvement, if any, in the steam trade, and prices on mine-run and screenings remain about the same as have prevailed for the past few months. If there is any difference, screenings are being furnished at a less price, and hard to move at all in some instances.

Car service with the Louisville & Nashville railroad has been good so far, but there was some little shortage during the past week.

Indianapolis

The present cold wave has caused a shortage in the local coal supply in a number of towns and cities in the State. It was predicted some time ago that the retail dealer had not stocked up sufficiently to withstand the demands incident to continued cold weather and now the consumer is complaining because of inadequate deliveries and an increase in cost of 10c. to 25c. a ton.

A covert threat of some Indianapolis coal dealers is that they intend to engage in the furniture business, since D. Sommers & Co., furniture dealers, came forth with an offer recently to furnish the best double-screened Indiana lump coal to the public at \$2.75 all winter.

The coal dealers say the furniture company will lose money on every ton of coal it sells, and that they, as regular dealers, are not in the coal business for nothing, so they cannot meet the price. The price of Indiana lump was already \$3.25 and a raise was in sight when the offer was made.

Chicago

The recent advance of prices in the Chicago coal market has not caused any substantial reaction so far as sales are concerned. A large majority of the dealers report that the increased cost has stimulated the buying movement.

Chicago retailers are handling a big tonnage, but are not obtaining a corresponding profit. This is due in a large measure to the fact that retailers made contracts with consumers during the past

summer at the prices then prevailing and have not been able to suitably protect themselves by contracts with the producers. It is believed that there will be an advance within a short time on spot retail coal.

Smokeless coal is exceptionally strong and commands \$1.10 on spot sales. A continuance of the present brisk demand and a further increase in the car shortage in the West Virginia field may cause an additional advance soon. The market for screenings also shows unusual strength and there has been an increase in the buying of the hard cokes.

Prices direct from the mines in net tons to retail dealers and steam users on spot shipments are as follows:

Sullivan County:

Domestic lump.....	\$2.50@2.60
Egg.....	2.30@2.40
Steam lump.....	\$2.10
Screenings.....	1.47@1.52

Springfield:

Domestic lump.....	\$2.27@2.47
Steam lump.....	1.97@2.07
Screenings.....	1.42@1.52
Mine-run.....	1.82@1.87

Clinton:

Domestic lump.....	\$2.17@2.37
Steam lump.....	2.00@2.20
Screenings.....	1.42@1.52
Mine-run.....	1.82@2.02

Pocahontas and New River:

Domestic lump.....	\$4.30
Egg.....	4.30
Mine-run.....	3.15

Coke—Coke is quoted at: Connells-ville, \$4.50@4.65; Wise county, \$4.50@4.65; Byproduct egg and stove, \$4.95; Byproduct nut, \$4.55@4.65; Gashouse, \$4.85.

Minneapolis—St. Paul

Compared with the spring and summer business, when orders had to be forced from the buyer, present conditions afford quite a relief to the seller of coal. Bargain coal is a thing of the past—at least until the weather settles back again to a milder tone.

The dock shippers have had all they could do to keep up with orders. When the statistics for the Twin Ports for the season of 1911 have been completed, it will be found that the total receipts at Superior-Duluth docks exceeded those of 1910. These receipts with a large tonnage carried over from 1910, will give ample supplies to meet the demand from the consuming trade.

Outgoing shipments from the docks have been large and steady. They have been obliged to work day and night crews in order to keep coal moving up to requirements. The railroad facilities have greatly improved over what they were a few years back, and it is believed there is no danger of a coal famine because of inadequate transportation facilities.

The mild days at the close of November reduced the volume of orders but this was welcomed since it afforded an opportunity to catch up. The Franklin County and Carterville mines are all

running on full time, but the matter of cars comes in to retard shipments.

The price of \$2 is being maintained on lump, egg and No. 1 and \$1.65 for special stove. Carterville coals are held on an even basis, considering the difference in freight. There seems to be an increased tonnage of the smokeless coals into the Northwestern domestic trade this year, and it is thought a shortage will show on this coal first.

The anthracite men look for a cessation of operations in the spring but figure their stocks are enough to supply the needs during winter and spring.

St. Louis, Mo.

There was a slight break in the local market the early part of the week due to a plentiful supply of cars on some of the railroads and the fact that there is little demand. There is nothing to indicate now that it will go any lower, but there is some chance of its advancing until along about the middle of the month, when as a rule the coal market lags from Dec. 15 to Jan. 1, with the exception of steam sizes, for which there is a greater demand than supply.

Country business isn't as good as it has been, but the demand is pretty well taken care of. The prevailing prices are:

Carterville:

6-in. lump.....	\$1.45@1.55
3x6-in. egg.....	1.40@1.50
No. 1 nut.....	1.30@1.35
No. 2 nut.....	1.15@1.20
No. 3 nut.....	1.00@1.05
Screenings.....	0.60@0.65
Mine-run.....	1.00@1.10

Carterville Washed:

No. 1 nut.....	\$1.60@1.65
No. 2 nut.....	1.50@1.60
No. 3 nut.....	1.30@1.40

Franklin County:

6-in. lump.....	\$1.50@1.65
3x6-in. egg.....	1.50@1.65
No. 1 nut.....	1.40@1.50
No. 2 nut.....	1.25@1.35
No. 3 nut.....	1.15@1.25

Standard:

6-in. lump.....	\$1.05@1.10
2-in. lump.....	0.95@1.00
No. 1 nut.....	\$0.75
No. 2 nut.....	0.60
Screenings.....	0.35
Mine-run.....	0.85

Mt. Olive District:

6-in. lump.....	\$1.35
3x6-in. egg.....	1.00
No. 1 nut.....	0.75
No. 2 nut.....	0.60
3-in. lump.....	1.25

The high-grade coals from the inner field are holding their own at about \$2. There is a fair movement of West Virginia smokeless at \$5 per ton f.o.b. St. Louis for lump and egg, and there has been a falling off the past week in the shipments of anthracite, with practically no Arkansas coal coming in. Coke is moving somewhat slowly, with gas house at \$4.65 and byproduct at \$4.85 St. Louis.

Denver, Colo.

An advance of 20c. per ton in the price of slack coal from the northern fields and of 30c. per ton in the same commodity

from the southern bituminous fields has been announced.

The advance has been necessary because of the increased cost of mining, according to Vice-President David Brown, of the Rocky Mountain Fuel Company, and President Evans, of the American Fuel Company. They explain that the fixed expenses are the same now as when their mines were producing at full capacity, while the production is curtailed because of the strike now in progress.

Spokane, Wash.

Business is more active than it has been at any time in the last nine months, but there is no change in prices, and, dealers say, there is no indication there will be any big fluctuations in the next 60 days. Full crews now are at work in the Western Canadian mines, and shipping is under way.

Contrary to usual custom the railroads appear to be in good position to handle shipments. Some fears of a coal famine were expressed as a result of the protracted shutdown in the Crow's Nest, but these are being dispelled.

Portland, Ore.

Portland has as yet, had little real winter weather and as a result the demand for domestic coal has not been heavy. The coldest weather in the Pacific Northwest is usually encountered in February and March so there is yet hope for the dealer.

Importations of coal from Australia this season are light, but heavy enough for all purposes and there is no reason to fear any shortage. The output of the domestic article is steadily increasing in the Northwest and this is one of the reasons for the falling off in importations. The adoption of oil as a fuel has also had much to do with this.

Production and Transportation Statistics

LAKE SHIPMENTS FROM BUFFALO

Total shipments from Buffalo for the season which is now closed amounted to 3,896,379 tons. During the season of 1910 shipments were 3,639,368 tons.

GERMAN COAL PRODUCTION

Production		Coal	Coke	Briquets
September, 1910.....		19,002,966	1,977,938	1,742,965
September, 1911.....		20,069,983	2,033,924	1,964,879
First 9 months, 1910.....		162,670,873	17,351,543	14,336,653
First 9 months, 1911.....		173,144,172	18,665,724	16,009,815
Imports				
September, 1910.....		1,814,103	57,080	19,499
September, 1911.....		1,651,351	47,578	14,845
First 9 months, 1910.....		13,718,541	476,685	167,169
First 9 months, 1911.....		13,175,775	450,204	155,545

COAL AND COKE MOVEMENTS

The following is a summary of the coal and coke movements for the first 10 months of the present year according to advance sheets of the Bureau of Statistics of the Department of Commerce and Labor:

Anthracite shipments.....	57,645,558 ¹
Bituminous on 10 eastern railroads.....	113,381,803 ²
From five principal Atlantic ports.....	22,316,286 ¹
Lake shipments (anthracite)....	3,722,741 ²
Lake shipments (bituminous)....	14,986,653 ²
Monongahela river tonnage.....	7,486,145 ²
Davis Island dam tonnage.....	2,387,270 ²
Rail shipments from Ohio mines.....	14,959,548 ²
Receipts at St. Louis.....	6,020,034 ²
Connellsville coke (43 weeks)...	13,246,453 ²
Exports (bituminous).....	11,643,931 ¹
Exports (anthracite).....	3,016,127 ¹
Bunker coal supplied vessels....	5,570,548 ¹

¹Denotes long tons. ²Denotes short tons.

THE PENNSYLVANIA RAILROAD COMPANY

Statement of coal and coke carried on the Pennsylvania lines east of Pittsburgh and Erie is as follows:

	October	10 Months Ending Oct. 31
Anthracite.....	1,091,607	9,581,057
Bituminous.....	4,047,252	34,551,595
Coke.....	934,042	8,814,649

CHICAGO

Coal receipts at Chicago for the month of October were as follows:

Destination	Tons
Local commercial.....	824,243
Railroad.....	256,699
Foreign commercial.....	3,495,089
Foreign railroad.....	641,798
Total.....	5,217,829

Foreign Markets

GREAT BRITAIN

Tonnage arrivals are more satisfactory, but are not sufficient to materially affect the market, and prices are irregular for immediate loading. For December many collieries appear to have full order books and sellers are holding for higher figures. Quotations are approximately as follow:

Best Welsh steam coal.....	\$4.08@4.14
Seconds.....	3.90@3.96
Thirds.....	3.63
Best dry coals.....	3.96
Best Monmouthshire.....	3.66@3.69
Seconds.....	3.48
Best Cardiff small steam coal....	1.92@1.98
Seconds.....	1.80@1.86

GERMANY

Production and imports in Germany are as follows, in metric tons: